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Major Business Administration
Minor Sustainable Development

Intelligent Product Design

An Exploratory Study on the Chances and Challenges of the eco-effective Cradle to Cradle® Design Concept

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Preface

This bachelor's thesis is the completion of the interdisciplinary Bachelor of Arts Business Administration program at the Leuphana University of Lueneburg.

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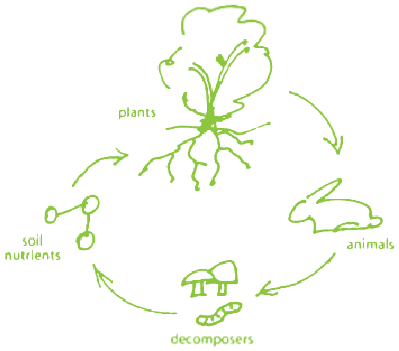
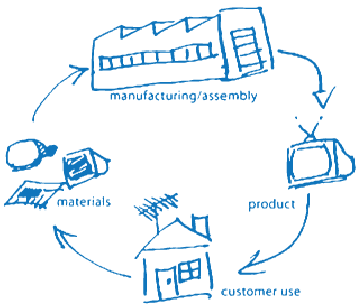
Abstract

The aim of this thesis is to generate reality-based hypotheses about the opportunities and obstacles that create the implementation of Cradle to Cradle for the companies Jules Clarysse NV and Steelcase Inc.[1] It discusses further which marketing-mix is appropriate for Cradle to Cradle products. Therefore exploratory expert interviews have been conducted with both companies. The empirical part is introduced by a literature study. From marketing perspective, the Cradle to Cradle approach for product design is investigated while taking into account that academic literature categorizes the concept on the one hand as consistent sustainability strategy, on the other hand as sustainable design. Moreover, the broad use of the expression design, within the literature of the Cradle to Cradle founders, is analyzed. Here, Cradle to Cradle design is holding out the prospect of Triple Top Line growth, rather than meeting only the economic bottom line. In regard of aesthetics, Cradle to Cradle aspires diversity in contrast to prevailing principles of Functionalism and universal design solutions. The "hidden" design assignment of Cradle to Cradle, service design, is highlighted as sphere that should be progressed. All these considerations form the interview guideline. The interviews serve as reality check whether there result Triple Top Lines and new service models for the companies and explore how aesthetics and tools of the marketing-mix are handled in Cradle to Cradle practice.

Keywords: Cradle to Cradle design, design for the Triple Top Line, eco-effective products, sustainable design, marketing–mix, circular economy, service design.

[1] The cases are not intended to serve as endorsements, sources of primary data or illustrations of effective or ineffective management.





The biological and technical nutrient cycle of C2C Design Concept (quoted from EPEA 2012a).

Our goal is delightfully diverse, safe, healthy and just world, with clean air, water, soil and power - economically, equitably, ecologically and elegantly enjoyed.

McDonough and Braungart

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Abbreviations

C2C	Cradle to Cradle®
C2CPII	Cradle to Cradle Product Innovation Institute
EPEA	Environmental Protection Encouragement Agency
IMP	Intelligent Material Pooling
MBDC	McDonough and Braungart Design Chemistry
B2B	Business to Business
B2C	Business to Consumer
CEC	Commission of the European Communities
CSR	Corporate Social Responsibility
DDC	Danish Design Center
IPP	Integrated Product Policy
LCA	Life Cycle Assessment
LOHAS	Lifestyle of Health and Sustainability
MAK	Maximale Arbeitsplatz - Konzentration
MKG	Museum für Kunst und Gewerbe
OECD	Organization for Economic Co-operation and Development
UN	United Nations
UNCED	United Nations Conference on Environment and Development
USA	United States of America
WBCSD	World Business Council of Sustainable Development
WCED	World Commission on Environment and Development
cf.	confer
cp.	compare
e. g.	(Latin: exempli gratia) for example
etc.	(Latin: et cetera) and so on
i. e.	(Latein: id est) that is
ibid.	(Latin: ibidem) the same place

Definitions

CRADLE TO CRADLE GLOSSARY (quoted from EPEA 2012b)

ABC-X CATEGORISATION

A ranking system developed by EPEA to classify all substances, materials and products in terms of their human and environmental health effects. Substances, materials or products labeled as "A" are "optimal" with respect to human and environmental health; Those labeled as "B" are considered "optimizing," where there is room for improvement; Those labeled as "C" are "tolerable," but could either be replaced or optimized toward the A level; Lastly, "X"-substances, materials or products that are not acceptable due to their adverse effects on human or environmental health, and need to be replaced with healthier alternatives.

DOWNCYCLING

The practice of recycling a material without defining its future use(s). This results in greater entropy and therefore a decrease in the value and potential of the material for future uses.

INTELLIGENT MATERIALS POOLING

A framework for the collaboration of economic actors within the technical cycle, which allows companies to pool material resources, specialized knowledge and purchasing power relating to the acquisition, transformation and sale of technical nutrients and their associated products. The result is a mutually beneficial system of co-operation amongst actors along the supply chain that supports the formation of coherent technical cycles and the enabling of product-service strategies.

LIFE CYCLE ASSESSMENT

A technique to determine the potential environmental impacts of a product by examining all material and energy inputs and outputs throughout each stage of its development (production, use, disposal and re-use).

PREFERENCE (P) LISTS

A tool developed by EPEA in order to group all materials that are to be included for use in the making of a particular product based on their human or environmental health effects. This tool includes the use of ABC-X Categorization and allows designers and developers to characterize and observe the optimization process of a particular product.

UPCYCLING

The practice of recycling material in such a way that it maintains and/or accrues value over time (the opposite of downcycling).

I Introduction

What importance has product design for a company these days? Lately, the Museum für Kunst und Gewerbe [art and trade] in Hamburg devoted a whole exhibition to the complex process of industrial product design in the context of cultural studies.[2] The main focus was thereby on products of *"incomparable popularity"* designed by Jonathan Ive for Apple Inc. The common praises for the *"very consistent and recognizable [Apple] design",* to which the company owes its success, were overshadowed by one critique - the call for a holistic sustainability approach by the multinational company (MKG 2012a; Wiensowski 2011). Conversely, there are nowadays companies conquering the mass markets with a wide range of "eco – products". To those, Jacquelyn A. Ottman, an often quoted marketing expert, predicates in her recently published book "*green is now mainstream"* and *"we are all green consumers"* (2012: 1; 22).

In the mentioned exhibition a certain design concept has been named as a role model for **Intelligent Product Design**[3]: The Cradle to Cradle (hereinafter C2C) design concept by Michael Braungart and William McDonough is title-giving to this thesis. The founders see the reason for the ecological crisis in *design failure of the industrial revolution*, particularly in the resulting linear product system of *"Make, Take, Waste"* (Braungart and McDonough 2002a: 17ff). In that sense, their agencies in Europe and USA have been consulting for twenty years companies worldwide towards products and architecture[4] that are designed with full knowledge of all chemical characteristics so as to obtain economic success and wholesomeness to the end user and environment. Braungart and McDonough's international bestseller[5] *"Cradle to Cradle: Remaking the Way We Make Things"* postulates the "*transformation of human industry through ecologically intelligent design*" (Braungart and McDonough 2002a; MBDC 2012a). What is a *"green"* or *"sustainable"* product design? With a simple introduction, Braungart and McDo-

2 Exhibition: "Stylectrical. On Electro-Design That Makes History" Museum für Kunst und Gewerbe. Hamburg. August 26, 2011 - January 15, 2012.

[3]"Intelligent Product Design" does not refer to the proposition of divine creation that is connoted with the term "Intelligent Design" since a book by Patrick Edward Dove. Instead the chosen title addresses Braungart's a priori research subject "The Intelligent Products System" (see Chapter 3) and the term "Ecological Intelligence" as a component of the C2C - terminology.

[4] The Cradle to Cradle Architecture will not be mentioned any further as it goes beyond the scope of this thesis.

[5] It has been translated to German (2003a), Italian (2003), Spanish(2005), Dutch (2007), Hungarian (2007), English (UK), Chinese, Chinese (Thaiwan 2008), Danish (2009), and French (2011) (EPEA 2012c).

nough explain that putatively "sustainable products" may come along with unpleasant characteristics (2002a: 4). They picture an environmental conscious consumer that rethinks her/his purchase decision and deliberately (as s/he is an "early adopter" willing to push ethical consumption forward) acquires a new, innovative, recycled carpet made of polyester soda bottles to decorate the floor in the living room. Braungart and McDonough argue that the energy use of recycling process was often the same as the production of a new carpet as well as the amount of generated waste. Moreover for the recycling process, it is crucial to add harmful additives in order to reach the desired consistence of a "fluffy" carpet. The reason therefore is according to Braungart and McDonough the *downcycled*[6] quality of the raw material. By melting together different plastics, glue and print color (altogether not produced with such a reuse in mind), the resulting polypropylene fibers are shorter and contain opaque ingredients (Braungart and McDonough 2009: 20). The recycled carpet might be off-gassing and abrading the toxics into the housing so that the new carpet results to be harmful to the health of all inhabitants and deteriorating the in-house air. Additionally, the poor material will not be recycled after this second life-cycle but end up in landfill as hazardous waste (Braungart and McDonough 2002a: 4). Resulting in such product characteristics, the product design clearly fails to conform to the consumer's intentions.

From business perspective the C2C concept declares *design* to the core business segment. To be specific, it enlarges the classical competences of product design to all five key stages of the product life-cycle: Materials, production, transport, use and "end-of-life". The Cradle to Cradle design concept requests companies to rethink their product design instead of reducing the environmental impact by "end-of-pipe" solutions. The founders named this strategy *eco-effectiveness* in order to distinguish their idea from efficiency. They accentuate C2C to be a *business concept* and avoid contextualizing it within the sustainable development debate. The European project "C2C Network" concludes *"the implications of Cradle to Cradle for Industry can be summarised as ranging from product specific requirements in the design and production stage over far reaching supply chain challenges and opportunities to leading to a completely new innovative business concept"*(Stouthuysen and Le Roy 2010:14). This quote emphasizes the motivation for this empirical thesis. This **exploratory study** centers the experience of two

[6] see: Cradle to Cradle Glossary (page XI)

companies operating in the field of interior design regarding **the chances and challenges of the eco-effective Cradle to Cradle design concept**. Further, it yields on the chosen marketing-mix. The methodology therefore is divided into two parts: First a *literature study* of product design in general and C2C in particular is conducted. Based on that, the interview guideline is developed. Secondly, the *empirical study* deals with the exploratory expert interviews and their evaluation. The objective of the present work is to generate reality-based hypotheses limited to the two explicit companies. Within the present thesis the *business concept* C2C is investigated from the strategic marketing point of view not only because the comparison to environmental management systems contradicts with the founders' understanding of C2C, but also to explore forward-looking entrepreneurship. Nevertheless a supplementary excursus clarifies the C2C position within the sustainability strategies.

The remainder of the thesis proceeds as follows. The theoretical conceptual background defines common ground; the relevant terms for this study are contextualized in two features: The introduction to product development (cp. 1.1) embeds the theory of product design and the review of the sustainability strategies (cp. 1.2) outlines the position of C2C. In a more detailed manner, the etymology and history of product design will be introduced, as well as its determinants and the formation of sustainable design (cp. 2.1-3). Combining product design and sustainability strategy, the concept of Cradle to Cradle Design is explained and contextualized within the previous topics (cp. 4). Along the theoretical background first presumption will be drawn on the obstacles and opportunities that result for a company that implemented C2C Design (cp. 5). Starting from Chapter 6, the qualitative study is subdivided into a methodical background and a content analysis of the interviews according to Mayring (2010). As expected, the work will close with a critical analysis of the applied methodology and outlook on future work, before it concludes.

THEORETICAL - CONCEPTUAL BACKGROUND

1.1 Product Development

"New product development" is commonly defined as *"the process that transforms technical ideas or market needs and opportunities into a new product on to the market"* (Walsh et al. 1992). Figure 1 illustrates the place of product development activity within the company:

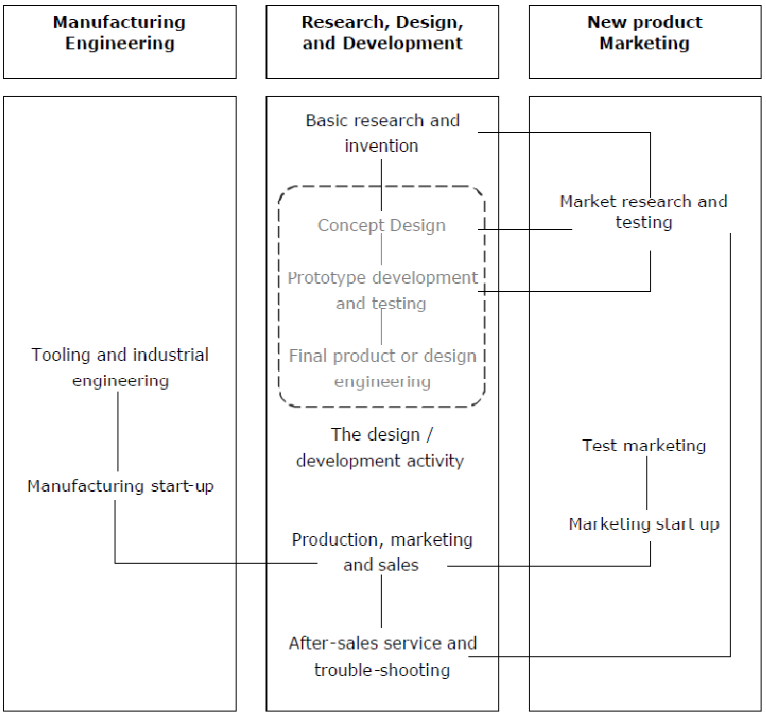

Figure 1: The process of technological innovation showing the role of the design and development activity (based on Roy and Bruce1984; quoted from Mutlu and Er 2003:10).

"Design", "product design", "product design and development" and *"industrial design"* are usually subject to confusion (Mutlu and Er 2003:10). Some models of the product development process use "design and development" as synonymous with the whole *"product development process"* (Walsh et al. 1992). Consequentially, *"product design"* stands in the core of the *"new product development"* process (Mutlu and Er 2003: 10; Walsh et al. 1992; Freeman 1982; OECD 1992).

1.2 Sustainability Strategies

The normative model *sustainability* inheres increasing uncertainties especially in the entrepreneurial practice (Langer 2011: 2). Discussions on international politi-

cal level drew the public attention to the consequences of industrialized economic practice, for instance toxic emissions from production that poison employees, destroy ecosystems and decrease biodiversity, social responsibility, limits of exploitation and depletion of natural resources (Jonker et al. 2010: 16). On this behalf the independent World Commission on Environment and Development (WCED), chaired by the environmental minister and president of Norway, Gro Harlem Brundtland, was formed by the UN. According to most literature the WCED's report "Our Common Future" (1987)[7] coined the terms *sustainable development* as a process of social change to reach the desirable status of *sustainability* (Grunwald and Kopfmüller 2012: 20; 7). The report emphasizes first that sustainable development includes inevitably a global perspective and that secondly environmental and developmental aspects are inextricably linked: *"Sustainable development integrates economics and ecology in decisions making and law making to protect the environment and to promote development" (WCED 1987: 37).* Often quoted is the third principle: the need for inter- and intra-generational justice as ethical foundation of the social change: *"Sustainable development wants to archive social equity between generations and within each generation. ... It meets the needs of the present without compromising the ability of future generations to meet their own needs"* (WCED 1987: 32, 43). Nevertheless this consensus was only reached due to the fact that the term *sustainable development* remained abstract and unspecific enough, as Langer criticizes (Langer 2011: 12). Meanwhile authors worldwide condemn the inflationary use and escalating devoid of substance. Economy commits to the mission statement of sustainability. For the international coordination, the World Business Council of Sustainable Development (WBCSD) was founded in 1995 and respective reporting models, different strategies and business models were widely adopted (Grunwald and Kopfmüller 2012: 8-9). The relevant technical approaches published around the UNCED in 1992 were analyzed by the German social scientist Joseph Huber. He clustered the different positions and categorized them into three strategies: *sufficiency, efficiency* and *consistency* (Huber 1995). The commitment of a company to one of these conflictive sustainability strategies is an extensive decision. Consistency is the only strategy that implicates the quality of anthropogenic material and energy

[7] The Brundtland Report, as it is commonly called to honor the chair, initiated also the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro, 3-14 June 1992.

flows while sufficiency and efficiency focus on the minimization of the quantity of total material flows (van Zyl 2010:10).

1.2.1 Sufficiency

Sufficiency addresses the consumers' consumption behavior. It bases on the growth and consumption critiques of the 1960s "original ecology movement" and calls for renunciation and modesty (Huber 2003: 217). Its supporters prove the necessity for sufficiency by several model calculations, like *"The Limits of Growth"* (Meadows et al. 1972) with computer modeling stressing the definite resources by growing demand. Similar approaches to measure human impact on the environment are the *Carbon, Water* or *Ecological Footprint*, a scale unit that expresses material and energy flows in land use (Rees and Wackernagel 1997). The *Ecological Rucksack* calculates the total "invisible" material input of manufacturing a product from cradle to the point of sale (Schmidt-Bleek 1994, Bringezu 1997).

1.2.2 Efficiency

The strategy of efficiency encourages industry to produce less material-intensively. The concept was formulated by Schaltegger and Sturm (1989) and introduced in 1992 through "Changing Course" (Schmidheiny 1992), a publication of the WBCSD.[8] The rise of resource productivity seems economically profitable, but only "less bad" for ecology. Two environmental scholars demand dematerialization and reduction to the lowest possible input-output-coefficient: The "factor 4" (Fussler 1994; Schmidt-Bleek 1994) and "factor 10" (Von Weizsäcker and Lovins 1998) were estimated to offset economic and population growth. Without structural change, efficient industry is merely able to delay the threats of resource scarcity, especially regarding an increase in human population. Huber describes this as *"advances on the wrong object"* (Huber 2003: 220). Further, he identifies as weakness that the increase in efficiency takes place during the maturation phase of the product life-cycle learning curve. As a consequence its marginal utility is reached earlier (Huber 2003: 220 - 221). Additionally, the reduced

[8] *"Eco-efficiency is reached by the delivery of competitively priced goods and services that satisfy human needs and bring quality of life, while progressively reducing impacts and resource intensity throughout the life cycle to a level at least in line with the earth's estimated carrying capacity"* (WBCSD 1996: 6).

ecological impact resulting from efficiency increase is abrogated by increasing growth i.e. additional consumption which is called "rebound" or "boomerang" effect (Huber 2003: 221-222).

1.2.3 Consistency

„Konsistenz ist keine "Variante" von Suffizienz und Effizienz, und auch kein „dritter Weg" dazwischen. Konsistenz ist ein ***anderer, grundlegend weiterführender*** *Ansatz."* [9][Emphasis as in original](Huber 2003: 224). Consistency addresses the characteristics of material and energy flows. It questions the appropriateness of material and thereby demands solutions to be found case-by-case (Huber 1995: 138 pp). Huber refers with his terminology of "consistency" to the objectives of the Brundtland report to *"reorient international relations to achieve trade, capital and technology flows that are equitable and* ***consistent*** *with environmental imperatives"* [own emphasis] (WCED 1987: 40). Since the 1980s, new product and technology approaches beyond sheer efficiency increase appeared. The following overview shows the development (Huber 2003:223): Ecological modernization (Huber 1982,1995; Mol, Sonnenfeld and Spaargaren 2009), Industrial Ecology (Frosch and Gallopoulos 1989), Clean Technology (Kemp and Soete 1992), Gestaltung des industriellen Metabolismus [Composition of the Industrial Metabolism] (Ayres and Ayres 1996), Material flow management (Enquête Commission 1994), Design for Environment ("eco-design") (Paton 1994), Constructive Technology Assessement (Rip, Misa and Schot 1995), Economy of the Re-production (Hofmeister 1998, Biesecker and Hofmeister 2006), Bionik (also biomimicry, bio-inspiration, and biognosis) (von Gleich and Bannasch 1998). Speaking of product development, Huber's approach of consistency implies change of production processes that promotes innovation. That innovation brings the material use of industrial society closer to an inclusion into nature's metabolism. Huber revised and analyzed the strategy of *eco-effectiveness* by Braungart and McDonough and identified it as similar to his *metabolic consistency* strategy (Huber 2003: 224; van Zyl 2010:10): **Metabolic Consistency** (Huber 1995, 2004) also referred to as **Eco-Effectiveness** (Frei 1999; Braungart and McDonough 1999, 2002a).

[9] Own translation of German original: "Consistency is neither a 'variation' of sufficiency and efficiency nor the third path in between. Consistency is another fundamentally continuative strategy."

Transferring all these sustainability strategies to practical application, a consumer bearing in mind sufficiency and the threat of plastic particles in the environment would be drinking tap water instead of bottled. Due to the efficiency strategy, a company would "dematerialize" the material input of soda bottles and re-use used soda bottles to produce carpets or park benches– or burn them efficiently. An eco-effective or consistent company would either design biodegradable bottles or "upcycle"[10] the discarded plastic bottles by eliminating the toxic ingredients and producing thereby new qualitative plastic bottles that are better recyclable.

2 Product Design

„Weit mehr als die künstlerische Produktion ... prägt die industriell produzierte und massenhaft rezipierte Alltagsästhetik die öffentliche und private Umwelt, darüber hinaus das soziale Verhalten"[11] (Selle 1987: 7). This chapter defines the terms *design* and *product design*, describes how leading aesthetics developed over time (cp. 3.1), stresses the economic pressure on design processes (cp. 3.2) and reflects how design theory adopted sustainability as model (cp. 3.3).

2.1 Definition and History

Etymologically *design* is derived from the Medieval Latin of the 14th century. The verb *designare* composes of the prefix *de* - [12] and the verb *signare* [13] and means literally "to create, fashion, execute, or construct according to plan, to contrive and to intend" (Mutlu and Er 2003: 13). Design has been transferred to Middle English as verb and noun. In the German language unlike than in English, French or Italian, the adopted word has only the connotation of external shape of utilitarian objects or communication carrier (Dally 2007: 11). Besides the etymology, the concept "design" comprises a variety of meanings at functional and strategic levels that make a generic definition complicated. The wide scope of perspectives results in diverse definitions addressing to 'design' in general, and 'product design' or 'industrial design' in particular (Mutlu and Er 2003: 13). This study refers

[10] see: Cradle to Cradle Glossary (page XI)
[11] Own translation of the German original: *"The industrially produced and mass-received commonplace aesthetics shape the public and private environment, and beyond the social behavior - far more than artisanal production."*
[12] The prefix is to be understood as to emphasize the constructive sense of interference more than the derogatory sense of reversal ("away, off") (Terzidis 2007: 68).
[13] This verb in turn originates from the noun *signum* ("mark") (Flusser 1995: 50).

to Mutlu and Er's distinction that **"*product design*" is a collaborative design activity *"with industrial design as the central practice"* devoted to design products**.

Referring to Marion Godau one can speak of design - in the nowadays sense - no earlier than the industrialization in the early 19th century. Due to the development towards large-scale production for anonymous customers, stock keeping and the division of labor, the entire product was no longer manufactured by a craftsman but created by the first "pattern designers" and assembled by machinery and workers (Godau 2003: 8). Extravagant ornaments, once manufactured exclusively for the aristocrat, have been copied in series and became available for the new middle class (Godau 2003: 9). Louis H. Sullivan's principle "form follows function" from 1896 changed the perception of product design and became the central paradigm for the next century. The form results from the objective of the product (Godau 2003: 10-11). In Germany there were newly formed movements, first the Deutscher Werkbund (1907) then the Bauhaus School (1919-1933) driven by the will to integrate traditional crafts and industrial mass-production techniques. Architects, artists and craftsmen discussed together the relationship of usefulness and beauty, the practical purpose of formal aesthetic in a commonplace product and whether a single proper form could exist or not. This group formed the counter - proposal "functional design" to the aesthetics of ornamented historicism and eliminated social differences through creative work (Godau 2003: 12). The German industrial designer and Functionalist Dieter Rams[14] formulated with the "Ten Principles of Good Design" the assignments to design (Rams 1995).[15] Rams and other influential designers of his time, Ludwig Mies van der Rohe and Buckminster Fuller, agreed on various philosophies of "Less is more". Their aspiration for extreme simplicity manifested in their slogans "Doing more with less" and Rams' "less, but better" and led to structures determined by basic geometric shapes with clean and fine finishes (Snell 2010). Conventional interpretations of industrial design, like the preceding ones, mention "form", "function" and "style". Whereas Gui Bonsiepe refers to "effective action" instead of categorizing design to this

[14] Dieter Rams worked 1965 - 1995 at the consumer products company Braun and is said to have influenced e.g. the work of Jonathan Ive immensely (MKG 2012b).
[15] GOOD DESIGN should be innovative; should make a product useful; is aesthetic design; will make a product understandable; is honest; is unobtrusive; is long-lived; is consistent in every detail; is environmentally friendly; is as little design as possible

cluster. He answers the question why products are invented, designed, produced, distributed, sold and used with the simple statement that they are all these in order to enable effective action (Bonsiepe 1996: 26). To characterize an action as effective, one has to declare the context and the valuation standard.[16] Here, one notes the simultaneous directions of mind-sets in contemporary design theory and sustainability strategies. Functional design and eco-efficiency have a quantitative approach in common while the effective design and eco-effective technology strategies seek contextual solutions.

2.2 Design and Business: The Bottom Line

In business, there is only one way to measure the success of product design: The bottom line. In fact, there are many "bottom lines": pre-tax profits, return of assets, stock price, return on equity, sales growth, earnings-to-assets ratio and so on. The designed product is abstracted as *"quantifiable result that can be tracked, compared and otherwise analyzed"* (Makower 1995: 66). Companies recognize product design as key to the cost of production. *"It is well known that although only 5–7% of the entire product cost is attributable to early design, the decisions made during this stage lock in 70–80% of the total product cost"*(Ullman 1997). There are diverse management methods to manage cost of production within industry - for instance the multidisciplinary approach "target costing". Target costing starts with appointing targets for selling price, volume and desired profit based on market research. In accordance to these, a target production cost is deduced. Then cost analysis is carried out to measure the actual cost to further answer the question whether cost reduction is required. Finally, the introduction of a product is decided based on these facts (Gagne and Dicenza 1995: 17). One industrial design policy determines product design decisions significantly in order to stimulate continuous demand without market saturation: Planned obsolescence. The phrase itself was popularized by US-American industrial designer Brooks Stevens, who defined it in 1956 as *"instilling in the buyer the desire to own something a little newer, a little better, a little sooner than is necessary"* (Adamson and Gordon 2005: 129). The consumer "is forced" to purchase a new upgrade product whether

[16]As an example therefore Bonsiepe named a lipstick. From the anthropologic point of view it is a tool to generate a temporary tattoo, which implies the social behavior of seduction and self-presentation. It does not make sense to talk about effectiveness without naming the implied standards, according to which a product is considered to be effective for a particular activity (Bonsiepe 1996: pp. 26).

from the same manufacturer or a competitor. Therefore Vance Packard accused Stevens of *"a sinister strategy of exploitation"* (ibid.). He differentiates between planned obsolescence of quality (functional obsolescence) and of desire (psychological obsolescence) (ibid.). While the first means to manufacture products with build-in breaking points (for instance in light bulbs), the second approach is to create the upgrade product appear modern and desirable (as with Apple electronics (Borries et al. 2011)) (Packard 1961). Within the company's structure, product design has been once located somewhere between marketing and sales. Along with professional practice and academic literature, product design is nowadays usually realized by interdisciplinary teams. This fact displays the various assignments for "product design" ranging from marketing to research and development and engineering (as represents in Figure 1) and its independence to sales, controlling and management (Godau 2003: 44). The Apple Inc. for instance attributes design with high importance. This is why the product designer J. Ive is senior vice president for industrial design and part of the top management (Borries et al. 2011). Several studies show the affirmative impact of design on corporate performance, measured in terms of profitability, share price, employment or exports. A known example is the one conducted by the Danish Design Center (DDC) in association with the National Agency for Enterprise in 2003 and 2007. As a tool to measure the level of design activity the *design ladder* was developed. The 4-step model groups companies' design maturity: Non-design, design as styling, design as a process and design as innovation (see Exhibit 1 for case study). The higher a company is up the ladder, the greater strategic importance design has for the company. The analysis concluded "*it seems evident that wider employment of design by Danish business will beneficially affect the economy as a whole in addition to contributing positively to the bottom-line of the businesses themselves"*(DDC 2003: 34).

2.3 Design in the Sustainability Context

The transition from "green" to "eco-" to "sustainable" represents a steadily broadening scope in design theory and practice and to a certain extent, an increasing critical perspective on ecology and design (Madge 1997: 66). In correspondence with the product costs, the early design stage determines whether or not a product is relatively sustainable, as it decides on the use of resources, modes of consump-

tion and the lifecycles of products and services (Ramani et al. 2010: 21). *"Due to high levels of uncertainty regarding design embodiments at the early design phase, novel methods and tools are essential to providing designers a basis for ascertaining the degree of sustainability of a given product or process"* (Ramani et al. 2010: 2). Since the 1960s designers such as Papanek and Bonsiepe (1992) began actively to consider *"design's wider implications for society"* as *"reaction to the over-styled and consumerist perspective"* that industrial design, especially in the USA, had taken (Dewberry 1996: 2). Diverse approaches emerged, for instance Green Design, Responsible Design, Ethical Consuming, Eco-Design and Feminist Design. *"Accessibility and inclusiveness also received a great deal of design interest"* (Ramani et al. 2010: 21). But even "mainstream" design theories like functional design adopted the model of sustainability, first by taking environmental considerations into account. *"Of course this Minimalist aesthetic is only one of many theories of good design; however, the final thrust of [Dieter] Rams polemic fifteen years ago is particularly relevant as we move into the twenty-first century; 'GOOD DESIGN is environmentally friendly' he asserts"* (Snell 2010). Design approaches considering social, environmental and economic dimensions likewise, are rare. Rather it is distinguished between "socially responsible" and "environmentally sustainable design" (CEC 2009: 20-21).

Socially responsible design underlines the design assignment for companies to meet the needs of consumers and users. Design is able to increase usability and user-friendliness. *"User-friendly and safe products and services benefit all users, but particularly the atypical, underprivileged, vulnerable or minority users, such as disabled and elderly individuals, children and individuals from cultural or linguistic minorities"* (CEC 2009: 20). Thereby new market potential can be exploited. By taking the diversity of consumers into account, socially responsible design has developed side by side with Corporate Social Responsibility (CSR) (CEC 2009: 20). The emphasis on the social possibilities of design is comprised to following schools of thought: Accessible Design, Inclusive Design, Universal Design, Design for All, which is also called Design for Human Diversity, Social Inclusion and Equality.

In regard of **environmental approaches of design,** the academic debate is not likely as harmonious as the one about social responsible design. "*Its recent evolu-*

tion paints a more detailed picture. What emerges are various models describing two broad approaching fitting into a kind of either/or polarity: between eco-design on the one hand; and sustainable design on the other" (Sherwin 2004: 22). As examples therefore, Sherwin cites (2004: 22): Eco-Design or Sustainable Design (Dewberry and Goggin 1996); Evolutionary vs. Revolutionary Eco-Design (van Hemel 1998) and Eco-Efficient or Eco-Effective Design (McDonough and Braungart 1998). In order to give an impression on the wide-ranging starting points of environmentally friendly design, several approaches are listed (Ramani et al.2010; Sherwin 2004): Sustainable Design, Eco-design tools, Life Cycle Assessment (LCA), Design for Environment (DfE), Customer Driven Design, Value Analysis, Quality Function Deployment, Design for Manufacturing and Assembly, Design for End-of-Life Management, Design for Disassembly (DfD), Design for Material Recovery, Design for Reuse and Remanufacturing, Modular Design, Platform Design, Design for Upgradability, Design for Adaptability, Design for Durability, Design for Recyclability, Design for Triple Bottom Line, Cradle to Cradle® Design which is also named eco-effective Design or Design for the Triple Top Line.

3 The Cradle to Cradle Design Concept

Since 1987 the German chemist Michael Braungart is director of the environment institute *Environmental Protection Encouragement Agency* (EPEA). After years of consulting companies, he coauthored with Justus Engelfried *"The Intelligent Products System"* (1992, 1993). Braungart discussed these theses with the American architect William McDonough when they first met in 1991. Together they promulgated *"The Hannover Principles"* (1992) for the 2000 World Expo in Hannover. They adjusted the fundamental publication, renamed the system *Cradle to Cradle* design concept and refined the theory by consulting industry mainly in Europe (Braungart and McDonough 2002a: 15). In 1995, they founded the consulting agency *McDonough Braungart Design Chemistry* (MBDC) in Charlottesville, to extent their services to the USA. In 2002, they published their already mentioned design manifesto. Until today they have actualized projects with companies like Nike, BASF, Ciba Geigy Desso, Ford Motor Company, Steelcase Wendl AG, Hermann Miller Ltd, Philips, Ben&Jerry's, Wella, Trigema, Jules Clarysse, Triumph, Procter&Gamble, Otto, Iglo, VW, gugler*, Lego, Nike, NASA,

Ford Motor Company, Goodbaby and Maersk. In their second book *"Die nächste industrielle Revolution: Die Cradle to Cradle-Community"*[17] more detailed case studies are illustrated than in their first one. The C2C design concept is a business model that is classified by Huber as consistent sustainability strategy (cp. 1.2) and by Sherwin as stainable design concept (cp. 2.3). It has the ambition of developing products which are safe for human and environmental health, easy to recover and reusable in order to enable circular economy. Hence, it demands a holistic re-thinking of the product design process and exceeds the bounds conventional design criteria of functionality, aesthetics and costs (ibid: 153). The following overview represents the intended changes:

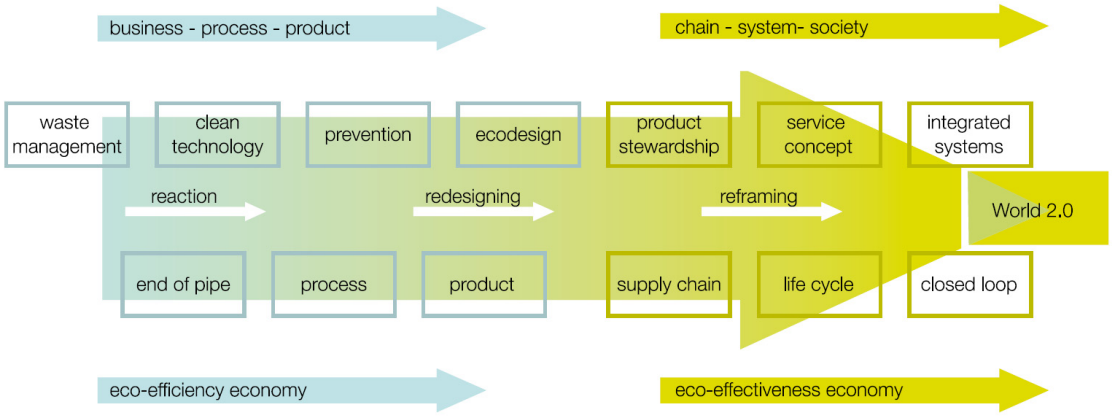

Figure 2: Sustainable materials management approaches: evolution from an efficiency towards an effectiveness approach (based on Rossy et al. 2010; quoted from Le Roy and Stouthuysen 2010: 8).

This chapter summarizes, based on the C2C literature, how C2C works (cp. 3.1 - 3.2), why it might be (beyond) sustainability (cp. 3.3) and how the molecular design approach broadens the conception of product design (cp. 3.4). Further, follows one's own consideration which marketing-mix might be useful for C2C products (cp. 3.5) and what criticizes academic literature about C2C (cp. 3.6).

3.1 Materials as Nutrients

The C2C design concept follows the *"principles of nature*" and nature serves as a model (Braungart 2002a: 227; 122). The cherry tree provides an often quoted allegory for the intended intelligent waste: It produces an abundance of flowers that are far from being all needed. Anyhow, its abundance makes sense as it is beauti-

[17] This book was published only in German Language.

ful to look at, does not harm anyone and offers top nourishment for new life (Braungart 2002a: 72 ff). The central principles of C2C are:

- **Waste equals food** as materials are either biological or technical nutrients (Braungart and McDonough 2002a: 92ff).
- **Use the current solar income** or other renewable energy sources (ibid.: 132ff; 136).
- **Celebrate diversity** (ibid.: 118ff).[18]

C2C literature distinguishes between two types of materials that revolve as "nutrients" in life-cycles: Biological *products for consumption* can be used safely because they are not only non-toxic, but even useful for the environment (they can be consumed by nature). While the high quality materials of the technical *products of service* continuously return to industry as the consumer only purchases the service of the product.

Figure 3: Cycle of products for consumption (quoted from Kälin 2008: 54).

Products for consumption (Figure 3) are things that wear out. Their biological, chemical or physical use - such as food and laundry detergent, shoe soles, car tires or brake pads - is intended and well thought out. Therefore their materials are molecular designed to go back into biological systems along the *biological cycle* (Figure 3) and may consist of natural or plant-based materials or synthetic substances like biopolymers (Figure 4) that can biodegrade safely and return to the soil to feed environmental processes (Braungart and McDonough 2007: 1343). Figure 3 shows the product life-cycle of *products for consumption*. An example is

[18] C2C seeks to promote and combine biological, cultural and conceptual diversity. Furthermore water use is to be managed in order to maximize quality and promote healthy ecosystems while remaining respectful of the local impacts of water use.

the C2C towel by Jules Clarysse which is distributed in the Belgian ALDI supermarkets since the 26th of Sept. 2011 (Jules Clarysse 2011a). The organic cotton dyed with plant based colors can be "digested" by living organisms or cells to carry on life processes such as growth, cell division, synthesis of carbohydrates etc.

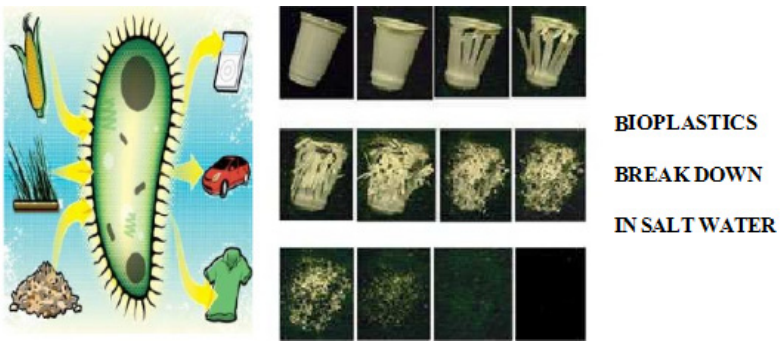

Figure 4: Algae Biopolymer (quoted from Braungart 2010: 61).

Thereby the adhesion for the manufacturer to recycle or "manages" the materials after use is theoretically omitted, but reality shows that C2C *products for consumption* often require industrial circumstances to be composted (Braungart and McDonough 2008: 102-103).[19] Braungart and McDonough explain further that the product represented an additional value to the ecosystem through its *eco-effectiveness* (cp. 3.3; 2002a: 140).

Products of Service (Figure 5) are products that consist of valuable material assets (and may or may not contain biological nutrients). The technical nutrient remains property to the manufacturer for continual re-use while the end-user "leases" the service of the product without assuming its material liability (ibid.: 109ff). Products that contain valuable but potentially hazardous materials can as well be optimized as *products of service* e.g. *"rent-a-solvent"* (ibid.: 112). *Products of service* are described to *"retain their high quality in closed-loop industrial cycle"* (ibid. 110). An example that Braungart gave in a recently published interview is a washing machine that will be launched in Germany in half a year. The costumer will purchase just the service of 3000 times washing. As the manufacturers are going to get their very own materials back, they can re-use them better. Instead of 150 low-cost plastics, the washing machine contains only five plastics, which are quasi-loaned by customers (Schuch 2012).

[19] For a description how the waste service companies Remondis and Van Gansewinkel process the products for consumption to compost, see Braungart and McDonough 2007: 99-103, 222.

Figure 5: Cycle of products of service (quoted from Kälin 2008: 27).

Products of Service are designed to be disassembled (Braungart and McDonough 2002a: 161). So, companies of the C2C community build up "intelligent material pools" of used components (Figure 5).[20] Through e.g. repolymerization, new product can be rebuild adopting new designs or elaborated technique.

3.2 Implementation and Certification

A 5-step process is applied to implement C2C within a company.

- Step 1: Free of …
- Step 2: Personal preferences
- Step 3: The passive positive list
- Step 4: The active positive list
- Step 5: Reinvention

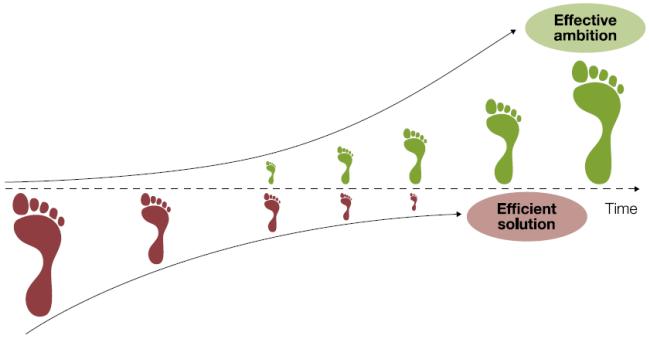

Figure 6: From negative to positive footprint through eco- effectiveness (quoted from C2CN Bulid: 10; © by Royal Haskoning).

This implementation process starts with an *"elimination of undesirable substances"* (Figure 6, reduction of negative footprint) and continues with *"the positive definition of desirable substances"*. The last step strives for the reinvention of products by reconsidering *"how they may optimally fulfill the need or needs for*

[20] A broader review on this cooperation system is given in the article: M. Braungart, W. McDonough, 2003b. Intelligent Materials Pooling: Evolving a Profitable Technical Metabolism Through a Supportive Business Community, In: Green@Work Magazine.

which they are actually intended while simultaneously being supportive of ecological and social systems" (Figure 6, creating a positive footprint; Braungart et al. 2007: 1343-1344). The **first step** aims to replace the known culprits, the most hazardous substances. C2C seeks to eliminate the use of so-called X-substances, like mercury, lead, cadium and chrome VI that are suspected to be reproductive toxics carcinogens, teratogens, mutagens or endocrine disruptors (Braungart et al. 2007: 1344). Thereby Braungart et al. point out that "*such a free of approach has to be applied carefully to ensure that replacement substances are indeed better than those that are replaced"* (ibid.). The **second step** is to decide which substances should be included due to "personal preferences" based upon the best available information and scientific experience.

"Should a company prefer a substance which is potentially sensitizing or one which is persistent in the environment; a substance that may contribute to global warming or one that might end up harming marine life?" (ibid.). Meanwhile, the visual design and marketing-mix has to be decided. At this stage, as far as infrastructure and branding exist, the new product is launched to the market. The **third step** is where own definition begins. The launched product is examined scientifically while its production continues (Liedke 2009: 64). As illustrated in Figure 7, a systematic assessment of the toxicological profile of each ingredient is conducted in order to classify their potential (Braungart et al. 2007: 1344).[21]

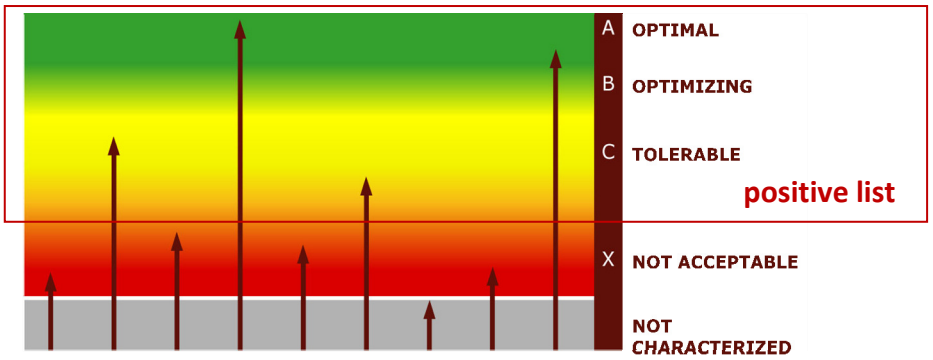

Figure 7: C2C assessment and improvement tool – the ABC-X categorization (Quoted from Kälin 2008: 23).

Here, the cooperation with all suppliers (and further subcontractors) is indispensable to achieve traceability. A list called *X-List* registers substances with the highest priority for removal. To identified those, the scientists compare the detected substances to the findings of the International Agency for Research on Cancer (IARC) and the German Maximale Arbeitsplatz-Konzentration (MAK) [Maximum Workplace Concentration] (Braungart and McDonough 2001c: 33). A

[21] See for further description "ABC-X Categorization" (Cradle to Cradle Glossary: page XI).

second list, called *Grey List,* includes substances for which no viable substitutes are currently known. It flags the items that need optimization and can be handled so far by sequestering it safely into the product *"where the delivery system is controlled and defined"* (Braungart and McDonough 2001c: 34). This guarantees an appropriate, safe use only as long as the gray flagged substance is processed in cycles as intended for technical nutrients. Finally, the *Passive Positive List* sums up substances positively selected for their useful qualities (ibid.: 35). The **forth step** is achieved when a product's material components have been positively defined through the *Active Positive List* as biological or technical nutrients. "*Whereas step 3 establishes knowledge of the degree to which each component in a product needs to be optimized, step 4 implements this optimization to the fullest degree"* (Braungart et al. 2007: 1344). *"With pleasure and a joyful outcome in mind",* the entire system is examined (Braungart and McDonough 2001d: 30). The *Active Positive List* includes the potential for re-materialization and "up-cycling". The practicality of the flow in closed-loop cycles is simulated again and again.

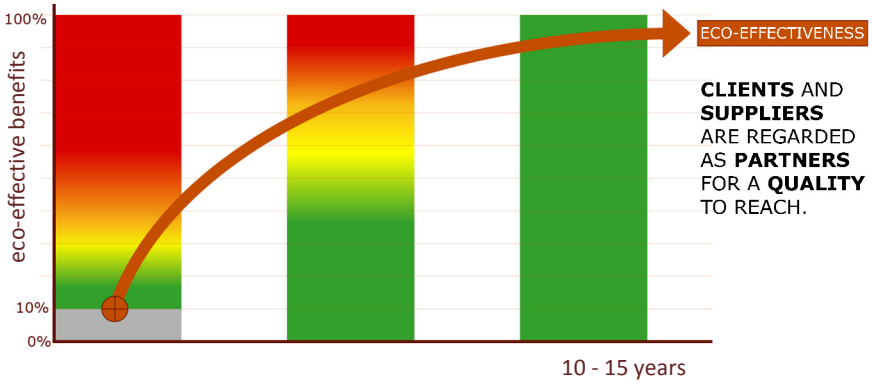

Figure 8: Progress of C2C product quality with time (quoted from Kälin 2008: 24).

The long-term task of the **fifth step** (Figure 8) involves the relationship between consumer and product. Services are to be designed in order to secure material recovery and consumer convenience (cp. 4.3.3). As an example the C2C milestones by the carpet manufacturer Desso show the implementation process over the years:

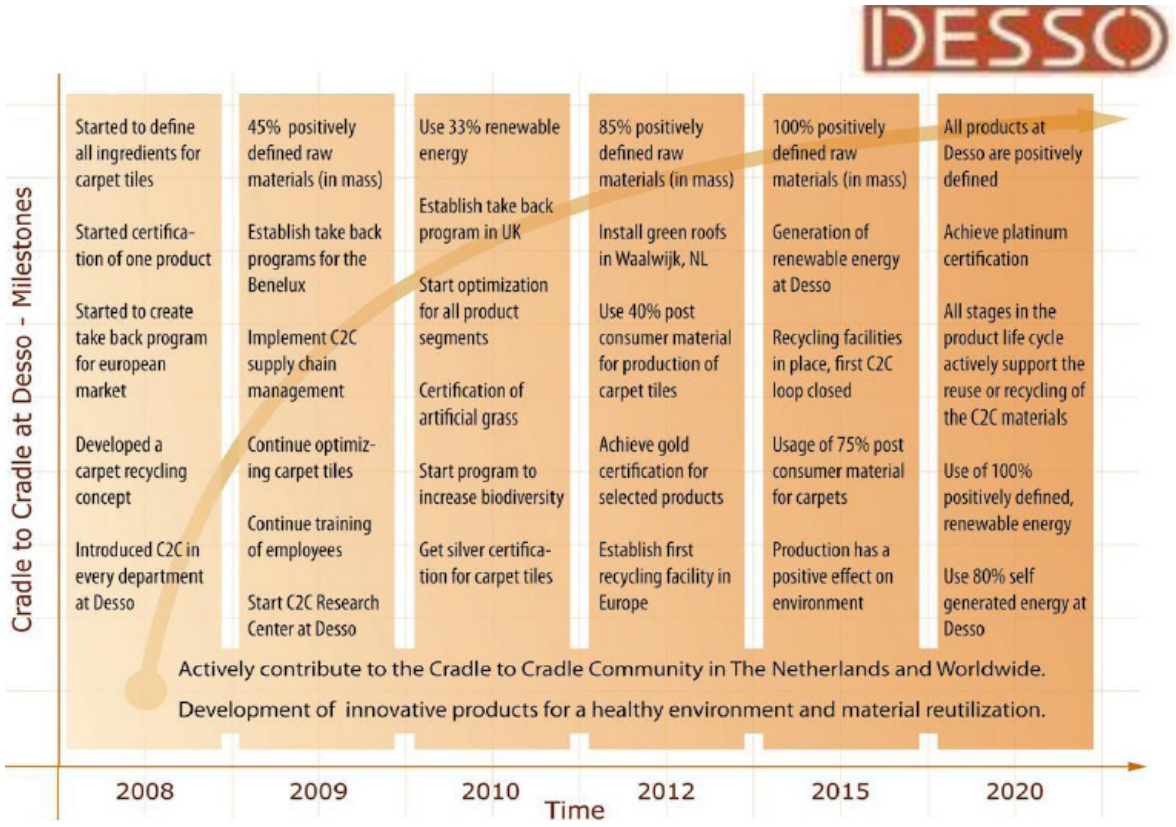

Figure 9: C2C at Desso – Milestones (Quoted from Braungart 2011: 36).

On behalf of the industry, MBDC developed in 2005 a **certification program** (Braungart and McDonough 2009: 60). Both consultancy firms, MBDC and EPEA, cross-certified their raw material, products and industrial processes with the Cradle to Cradle Certification in the categories basic, silver (see Figure 10), Gold and Platinum. The majority (87%) of products are Silver certified, with only 6% and 7% are Basic and Gold level certified respectively, while no product has reached Platinum so far (Anders 2011: 10).

Five modules - material identification, material reutilization, sun as energy, water and social responsibility - are essential according to this certification system (Vezzoli et al. 2010: 12; see Exhibit 2 for criteria summary). In 2008, Braungart and McDonough announced to transfer their intellectual property for product certification to the non-profit organization Cradle to Cradle Product Innovation Institute (C2CPII) in

Figure 10: C2C Certificate for Jules Clayrsse (quoted from Veldman 2012).

California that is now auditing on the certification application (C2CPII 2012). For the time of one year, a certified company is allowed to use the associated logo before an extension must be applied (Braungart and McDonough 2009: 60).

3.3 Eco- Effectiveness. Rethinking Sustainability?

Both founders seek an anthropogenetic access to the threat of industrial production: They intent to abolish mankind's sense of guilt for destroying nature and elate humans to "become native" to earth. Moreover, industry is encouraged to create positive impacts on the future. Therefore their strategy *eco-effectiveness* works as a positive agenda towards building a "good industry" (Braungart and McDonough 2002a: 68-91). *"Eco-effectiveness seeks to design industrial systems that emulate the healthy abundance of nature"* (McDonough 2006). Anyhow, the founders do not contextualize the C2C design concept in the broad debates on sustainable development (van Zyl, 2010: 9). Neither do they refer to Huber's differentiation between quantitative and qualitative material flow approaches nor the consistency strategy (van Zyl 2010: 10). Despite, Braungart even locates the C2C design concept as *"going beyond"* sustainability (Braungart and McDonough 2008a: 226-227) and McDonough criticizes WCED's definition of sustainable development for *"the human point of view"* emphasizing that all species and their next generations should be considered (Braungart and McDonough 1992: 3). With the agenda *"doing the right things",* eco-effectiveness represents the opposition to eco-efficiency's *"doing things the right way"* (cp. 2.2; Braungart et al. 2007: 1342). Braungart compares the efficient, *"less destroying environment protection"* metaphorically with *"slapping your child less"* (Braungart 2007: 22). The given figure sums up the contradictory goals of the two strategies:

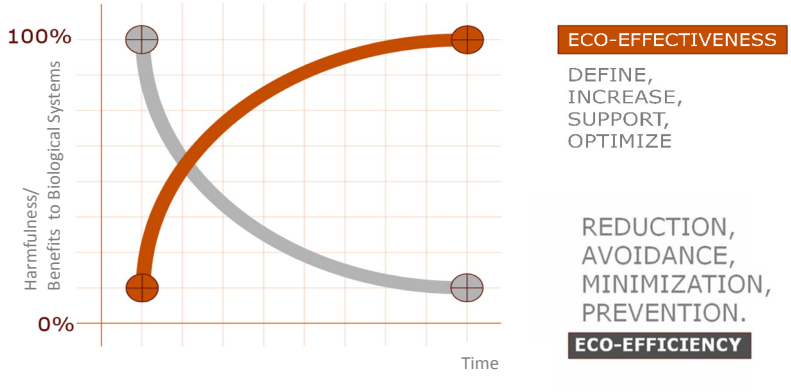

Figure 11: Perspectives of eco-efficiency and eco- effectiveness in comparison (based on Kälin 2008: 2).

3.4 Broader Design Assignment

C2C is often reduced to the chemical analysis of the product's molecules (cp. 3.2). But one should note that C2C literature covers a lot of ground with expression "design". With reference to the importance for the company (cp. 2.2) C2C intends to be integral to a company's continuous renewal of their operations, *"deep within corporate business strategy"* (Braungart and McDonough 2002b: 252). Hence, to implement the Cradle to Cradle idea truly in a company - design has to be perceived as strategy.[22] Within the sustainable design conceptions (cp. 2.3), C2C is communicated as *"unique"* fusion of biomimicry, modular design, design for disassembly and life-cycle design, while *"stating intentions and establishing roadmaps to achieve goals is absent from most other methods"* (Stouthuysen and Le Roy 2010: 18). Besides, *Cradle to Cradle*® and *C2C*® are registered trademarks of MBDC since 2005; unlike any other sustainable design approach it is a privately initiated standard. Applying eco-effectiveness goes along with a *"new design assignment"* (Braungart and McDonough 2002a: 89-91). This new C2C criteria are (Braungart 2007: 21):

1. Costs
2. Environmental Intelligence
3. Justice
4. Joy
5. Aesthetics
6. Performance Characteristics

This chapter picks up three perspectives on design: C2C does not follow only the economic bottom line (cp. 2.2), nor the Triple Bottom Line (cp. 2.3), the concept assures to generate Triple Top Line surpluses on the *criteria 1-3*. This will explained as first topic. Rather than "one-fits-all" design philosophies (cp. 2.1) C2C recommends *joyful aesthetics*; how, will be described in the second subchapter. As long-term mission for *performance*, the fifth step of implementation indicated the importance of service design (cp. 3.2). This topic isn't formulated in any official C2C publication but will be discussed with help of grey C2C literature.

3.4.1 Molecular Design for the Triple Top Line

The *Triple Top Line* is a *"strategic design tool"* (Braungart and McDonough 2002a:154; 2008a: 44). By these lines, Braungart and McDonough refer to econ-

[22] The design process is fused with the company's key objectives and plays a role at every level of development. This orientation is affirmed by the mentioned design ladder as the most recommendable attitude for businesses (see Exhibit 1).

omy, ecology and social aspects like the design for the Triple Bottom Line (cp. 3.3; Elkington 1998, 2005). They criticize this Triple Bottom Line approach as it quantifies all operations of a company under social and ecological aspects. *"Businesses calculate their conventional economic profitability and add to that what they perceive to be the social benefits, with, perhaps, some reduction in environmental damage – lower emissions, fewer materials sent to a landfill, reduced materials in the product itself"* (Braungart and McDonough 2002a:153). Again, C2C formulates its approach positively. Economy, ecology and equity are said to employ their dynamic interplay to generate value i.e. lower costs, environmental intelligence and justice (Braungart and McDonough 2002b: 251). The technical innovation of C2C may provide different **economic benefits** case-by-case. C2C products tend to be cheaper, since only the high quality ingredients are used and dubious ingredients that might inhere hidden costs, aren't even chosen (Braungart and McDonough 2008a: 55). Especially highlighted is the economic profitability of closed nutrient cycles which is interesting regarding the fact that real cycles are not to be expected until 15 years after implementation process. Albin Kälin, founder of EPEA Switzerland, argues materials and components would not have to be produced and thrown away again, so the costs for maintenance of the status of resources are the only remaining material costs. These costs tend to be lower than the costs for resource replacement and destruction:

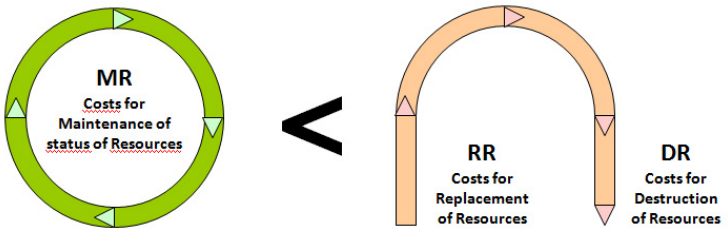

Figure 12: Costs for Maintenance of status of Resources are lower than Costs for Replacement and Destruction together (quoted from Kälin 2008: 49).

The Dutch "C2C learning community" calls this the long run "Total Cost of Ownership (TCO)" (Bor et al. 2011: 3). Highlighted is furthermore the opportunity that manufacturer or commercial representative of the product could fosters long-term relationships with returning customers through many product life-cycles (Braungart and McDonough 2007: 1343). Recalling the lessons learned regarding design and business (cp. 2.2), it is apparent that planned obsolescence is intended in the C2C concept even though it is not particularly named. On the one hand speaking

of *products for consumption*, Braungart and McDonough state *"throwing something away can be fun, let's admit it; and giving a guilt-free gift to the natural world is an incomparable pleasure"* (Braungart and McDonough 2002a: 109). On the other hand, *products of service* are purchased to the costumer for "*a defined user period"* and *"when they are finished with the product, or are simply ready to upgrade to a newer version"* the manufacturer uses the *"complex materials as food for new products"* (Braungart and McDonough 2002a: 111).[23] In addition, C2C is said to provide strong market recognition and enables a competitive advantage (Braungart and McDonough 2008a: 69). The international office furniture manufacturer, Steelcase, achieved with the "Think" chair, the very first C2C certified product, high sales (Braungart and McDonough 2008a: 55). It even has been the most sold chair worldwide in its category (Babok 2010: 20). Another financial surplus is created by design innovation: For instance the modular design leads to quicker assembly and disassembly time. The transportation of the modular product is cheaper as well. Some explicit advantages regarding the **ecological quality** illustrated in the Figure below:

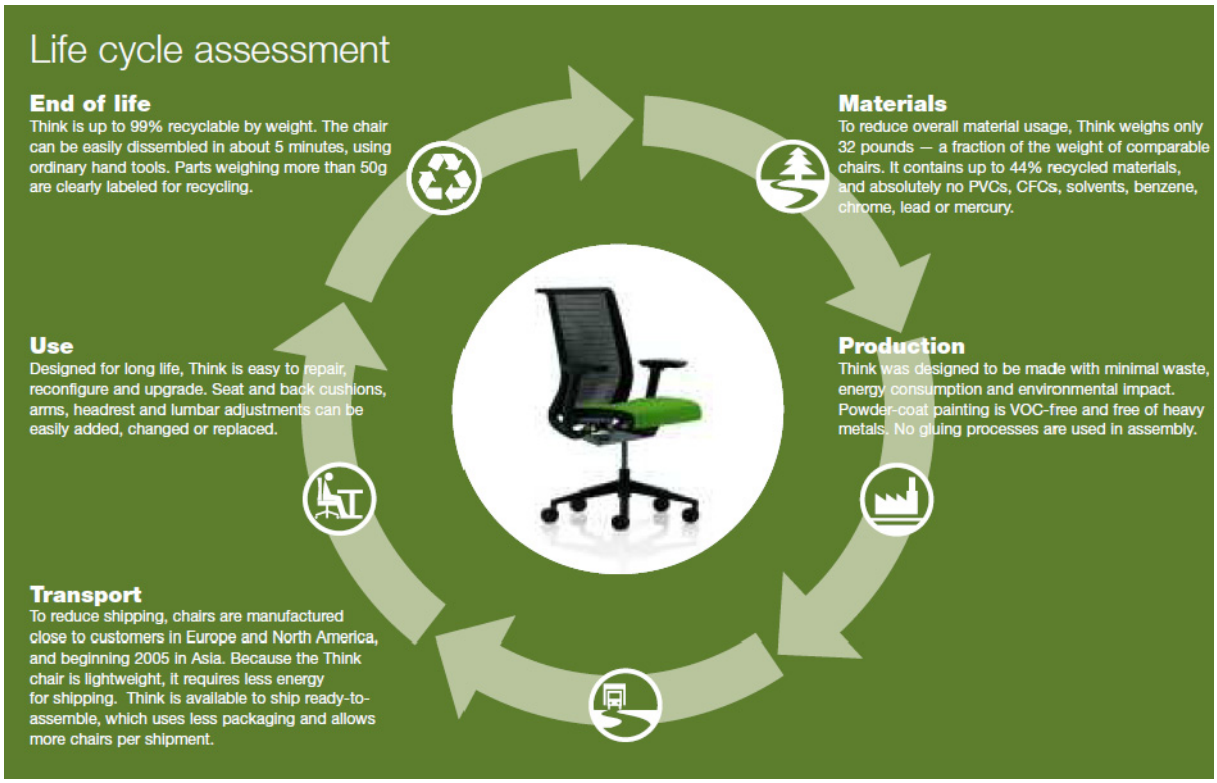

Figure 13: Every stage of the "Think" chair (quoted from Steelcase 2004a: 2).

[23] "*When you buy a product that is Cradle to Cradle certified, you know that only positive waste is created (waste = food), no matter when its obsolescence is planned"* justifies the communication agency ElcaMedia that cooperates with EPEA(ElcaMedia 2012).

Soon as the implementation process is fulfilled, C2C stands for the use of safe and healthy materials, concepts for material recycling through modular material separation, for the use of solar and water energy and responsible water management (Braungart and McDonough 2008a: 60). As **social achievement** C2C promotes *"strategies for more social responsibility"* which are described to derive from the *"ecological intelligence"* of C2C. For instance at Rohner's *"workers stopped wearing the gloves and masks that had given them a thin veil of protection against workplace toxins"* (Braungart and McDonough 2002a: 109).

3.4.2 Aesthetic Design

Regarding the aesthetic assignment of design, Braungart and McDonough dedicate a whole subchapter to their claim *"Form Follows Evolution"* (Braungart and McDonough 2002a: 141-144; cp. 2.1). They acknowledge Bauhaus for their *"social as well as aesthetic"* goals of replacing *"unsanitary and inequitable housing…with clean, minimalistic, affordable buildings unencumbered by distinctions of wealth or class"* (ibid.: 28). Nevertheless, they declare *"the International Style"* to be obsolete because its design is nowadays isolated *"from local culture, nature, energy, and material flows"* (ibid.: 29). According to the C2C principle to celebrate diversity, they adduce automobile industry as example. To honor the Filipino practice of decorating vehicles by *"providing customers with the opportunity to attach fringe and to paint creative, outrageous design in eco-friendly paints instead of constraining them to a 'universal' look"* (Braungart and McDonough 2002a: 141). *"People want diversity because it brings them more pleasure and delight"* (Braungart and McDonough 2002a: 144). But in practice, the creation of the outer appearance of C2C product's behooves to the consulted client. The EPEA team consists mainly of environmental scientists, not designers. The unspecific idea of evolution design cannot be observed so far. In the successful case studies of Steelcase or Desso, the designers chose global and abstract aesthetic designs that remind of Functionalism (2.1). For the development of "Think" for example, Steelcase engaged in 2002 the external design professional Glen Oliver Löw. Adopted was only the idea of *"mass customization":* The chair is available in fourteen different colors or with any Designtex fabric of Steelcase assortment (Steelcase 1996 – 2012b). The product was launched in 2004 and is, as already

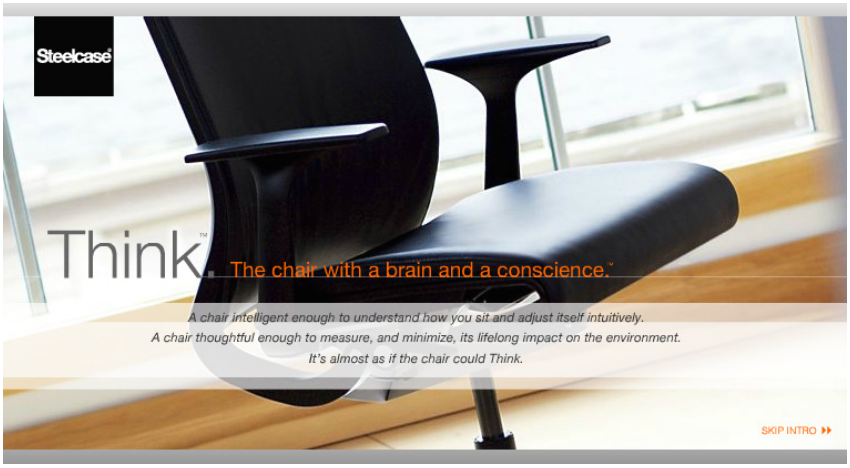

Figure 14: The "Think" design. The successful C2C office chair (quoted from Steelcase 2004b).

mentioned, the most sold chair in its category (Braungart and McDonough 2007: 160). It has been awarded with the iF Design Award, Red Dot Award and the IDEA Gold Award 2006, more granted to minimalistic design school than vague *"design for evolution"*. How could the "Think" success be explained? A study called "Konsumethik 2007" [ethics in consumption] carried out by the management consultancy Trendbüro on behalf of the OTTO group states that sustainability-conscious customers tend nowadays to self-indulgence and enjoyment rather than global improvement. They approach ethical consumption by aesthetics instead – as once – by ideology (Trendbüro 2007: 27). Aesthetic design can be an obvious added value for the end user. "*Instead of promoting a one-size-fits-all aesthetics"* industries should design "*in the potential for 'mass' customization",* by enabling packing and products that are compatible to *"local tastes and traditions without compromising the integrity of the product"* (Braungart and McDonough 2002a: 141). Transferring Villiger's statement that consumer behavior was highly influenced by individualism; the idea of *"evolution design"* promoting mass customization might be a chance for C2C companies (Villiger et al 2000: 296).

3.4.3 Service Design

Can your product be replaced by a service? The sphere of *service design* offers affirmative solutions to this question *"by studying systems that offer alternatives to the individual use of an object"* (Barbero and Cozzo 2012: 28). *"Today, innovation research still concentrates on new technology, products, and their sources…Services and, in particular, service innovation and the diffusion have*

been neglected. Only a few authors have emphasised the importance of non-technological innovation in the economy" (Cramer and Hipp 2011: 308). In 2012, Barbero and Cozzo recommend to develop new service designs as the response was very positive, since the use of a product *"is generally born out of the need to facilitate an action rather than the desire to possess the object in itself"* (Barbero and Cozzo 2012: 28). For C2C products this highly topical area of the design discipline is a harnessing tool to accomplish step 5 of the C2C implementation. *"The C2C debate often focuses on the technical aspects of innovation. But more is needed…Organizations must learn to develop contextual awareness, in other words they must become aware of developments in society and be able to translate them to the business and (new) opportunities for products and services"* (Bor et al. 2011: 28). It is assumed that the heads behind C2C are still elaborating their solutions for this design assignment as there cannot be found anything in the C2C literature. During the research on this topic, lecture documents by Albin Kälin were found at the homepage of Maastricht University that deal with new business service concepts: "*Cradle to Cradle Design innovations– towards a cycle economy. Mission: Develop Cradle to Cradle Solutions*." He subdivides the services in three target topics: *values of materials*, *customer relations and leasing, renting instead of selling* (Kälin 2008: 48). To maintain the value of the materials, services have to be developed to close the material loop. This has to be enabled by molecular design e.g. engineering of the products. But also marketing contributes through take back concepts (ibid.). Furthermore C2C companies have the opportunity to develop services to intensify customer relations and build up services for a customer network. *"As long as the user keeps the product, the bond between the producer and the customer will persist. The producer does not lose interest as soon as the consumer buys the product"* (Bor et al. 2011: 21). Customers can be linked to C2C businesses by sharing common values. Finally there are also new services needed to change the business culture from selling to leasing and renting. The values of service have to be defined e.g. for the lifetime of a product. Different service options regarding the financing are possible (ibid.). Elaborated service designs for the *products of service* have been listed by Kälin (Kälin 2008: 50-53):

The leasing system (How to re-use a product)[24]

[24]The Hermann Miller Mirra chair can be leased as service for 3 years. A take back system recollects the materials in order to repolymerize them. This realizes endless lifecycles.

The additional revenue (How previous waste transfers into a new product)[25]

The redemption system (How to make it easy for the customer)[26]

The framework system (How to improve product quality every 100.000 kilometers)[27]

The *biological cycle* inheres a systematic obstacle: Often industrial composting is needed to ensure the biodegradation of the *products for consumption*. So, the responsibility "to compost" the product of consumption properly behooves to the end-consumer. "*The closure of the cycle in business to business (B2B) appears to be easier because the volumes are larger and the flows are easier to deliver in separated form"* (Bor et al. 2011: 42). Jules Clarysse is an example of a company adjusting their business model to C2C. The CEO Luc Clarysse stated in the press release on the occasion of the product launching of their biodegradable towel, on 12th of October 2011: *"Wanneer we de handdoeken verkopen aan de consument hebben we uiteraard geen idee wat er mee gebeurt op het einde van zijn levenscyclus. Daarom gaan we samenwerken met grote hotelketens die veel interesse tonen in deze handdoek. In die sector hebben handdoeken een kortere levenscyclus en zodoende kunnen we die nadien gecontroleerd laten composteren bij bijvoorbeeld de firma VanGansewinkel"*[28] (Jules Clarysse 2011b).In respect of the business-to-consumer (B2C) challenge Kälin crystallizes (Kälin 2008: 54-55):

The refund system (How to reward the customer)[29]

The emotional issue (Reasons to rather decide for biological cycles)[30]

[25]The residues during the production of Gessner AG's CLIMATEX® LIFECYCLE™ are treated with conditioning and fabricated to felt to be used e.g. as garden mulch. As a byproduct this felt generates additional cash value.

[26]Shaw carpets have a 800 Phone Number printed on their back. The take back warranty reinforces the relation to the customer.

[27]The Ford Model U is planned to be leased for "an amount of mobility" e.g. 100,000 kilometers. This results as business benefits because product innovations can be introduced frequently due to the defined life span of the product. Furthermore is enables the C2C cycles and a high level quality of the raw materials.

[28]Author's translation of Flemish original: *"If we sell the towels to the consumer, we have obviously no idea what happens with it at the end of its life cycle. That is why we work with major hotel chains that show a lot of interest in this towel. In that sector towels have a shorter life cycle so that we are able to let them be composted subsequently in a monitored manner for example through the company Van Gansewinkel."*

[29] The consumer receives 1 € for every used biodegradable T-Shirts of Trigema. This business to customer is a service that forms a relation network.

[30] To underline the need for biodegradable underwear, Triumpf uses emotional communication that stresses the safety for biological cycles and human health. These common values reinforce the business to consumer relation.

3.5 Marketing - Mix for C2C Products

Summing up, the Cradle to Cradle design concept leads to the imperative to develop marketing strategies in order to enable the whole C2C system.[31] Thereby marketing–mix is understood as the *"4Ps"* of E. Jerome McCarthy: *product, promotion, place and price* (McCarthy 2009). This perspective will be supplemented by the *"Megamarketing"* perspective according to Kotler who added the dimensions *public relations* and *(political) power* as advised by Villiger et a. (Kotler 1986; Villiger et al 2000: 50). Kreilkamp defines the following approaches for each of those marketing-tools for tourism but these can be transferred to products as well (based on Kreilkamp 1998 like in Schmied 2009): The product policy includes the choice of target area, product aesthetics, product positioning and program politics. The price policy comprises pricing, price differentiation, condition or provision. Distribution policy covers plament control, distribution channels and distribution system. Communication policy develops advertisement, sales promotion, fairs and Public Relation.

Product: The product policy researches the product's life-cycle which is a requirement of the C2C implementation, anyway. Some C2C companies are already using illustrations to communicate the idea of closed cycles (see Figure 13). Furthermore the companies applying C2C have various product-mixes. *"Some are primarily interested in certifying C2C products; others want the brand and/or the business itself to be fully associated with C2C"* (Bor et al. 2011: 18). The width of product-mix varies within the C2C industrial community. It must be noted that Desso Holding NV is the only company that innovated all its product lines to C2C.[32] Because of the company's economic success, the London Business School analyzed their case and included the case study to management curriculum (Desso 2012a). Adopting the C2C philosophy implicates the product line's depth to guarantee diversity i.e. to offer as many product variations as possible (cp. 3.4.3). C2C hereby does not give any advises on how to handle the threat that entails variations: *Unplanned Product Cannibalization* i.e. an unexpected loss of turnover because of a new product of the product line.

[31] This chapter is only giving a superficial overview on this topic because of the limited scope of this work.
[32] Desso provides a detailed C2C brochure downloadable at http://www.desso.com/Cradle_to_Cradle_Brochure_EN.pdf. (Desso 2012b).

Place and target market: As the C2C industrial companies are normally manufacturers, they have to choose between direct and indirect distribution channels i.e. whether to distribute directly to customers or involve intermediaries (e.g. retailers) (Zimmerer et al. 2007). Furthermore there is the distinction between intensive (i.e. supermarkets), selective (i.e. "suitable" retailers) or exclusive distribution (i.e. authorized dealers). This decision influences the adequate price strategy. If e.g. the mass market is chosen for the C2C product its price has to be aligned with the mass market expectations. Here C2C literature does not give explicit recommendations. Anyhow - as C2C strives for economic viability - economics of scale are desired in order to reach a sufficient selling price while developing the mass. So, the aim of C2C products should be positioned beyond the eco-niche. Rather than initiating eco- product for the specialist shore, C2C seeks to create business cases.

Promotion: How should the companies communicate their C2C products? Ottman outlines *"six strategies of sustainable marketing communication"* (Ottman 2011: 111):

1. Know your costumer[33]
2. Appeal to costumers' self-interest[34]
3. Educate and empower[35]
4. Reassure on performance[36]
5. Engage the community[37]
6. Be credible[38]

There are worldwide only a handful of marketing agencies dealing with C2C. Braungart mentioned in a recent speech in Hamburg[39] the need for EPEA to ad-

[33] *"Not all cosumers will likely be aware of or concerned about all sustainability-related issuses, so it is important to pinpoint the consumers who will be the most receptive to your message"* (Ottman 2011: 112).
[34] *"Does your product…protect or enhance health…appeal to the style-conscious…save the consumers[!] money…is quiet, too?...Today's consumers want to know your whole story, so focus on primary benefits in context of a full story that incorporates the environment as a desirable extra benefit"* (Ottman 2011: 113-114).
[35] *"Consumers …applaud marketers' effort to provide the information they need to make informed purchase decisions as well as to use and dispose of the products responsibly…[Therefore] dramatize [your] environmental benefits…Be optimistic…[and] address the underlying motivations of consumers"* (Ottman 2011: 116-119).
[36] *"Greener products are still perceived by some as less effective or not having the same value as the more familiar brown alternatives…Remove this potential barrier to purchases by addressing the issue head on"* (Ottman 2011: 121).
[37] *"[Consumers] increasingly tend to trust the recommendations of friends and family even more than traditional forms of paid media; hence the astronomical ride in importance of social media in the past few years."* (Ottman 2011: 121-122). That is why Ottman recommends to *"engage in cause-related marketing"* and *"get creative"* (Ottman 2011: 123-128).
[38] *"None of these objectives can be met if green marketers don't meet my sixth strategy of…estabilishing credibility and avoid greenwash"* (Ottman 2011: 129-131).

join a marketing specified section. Beforehand, EPEA trained specialists from ElcaMedia, a multinational marketing communications agency to *C2C Marketing Consultants*. Their challenge is to extract the mass-communicable strengths of the C2C design concept in order to align the C2C companies' marketing towards the end-user on a more professional level.[40] ElcaMedia recommends as marketing communication *"an honest but positive approach which celebrates the possibilities rather than the obstacles. Be transparent with your knowledge and ambition"* (ElcaMedia 2010/11: 14). ElcaMedia's relevant key messages are proven on compliance with Ottman.

- *"Be positive! After all, Cradle to Cradle® is about creating, seeing, feeling and enjoying abundance"* (ElcaMedia 2010/11: 15) conforms with Ottman's call for positive communication and messages that are *"refreshingly upbeat and fun"* (Ottman 2011: xix, 118, 119).
- "*Make it obvious why quality is important. Quality is central to Cradle to Cradle®. When people truly understand this, price will instantly become secondary. Take the example of the toy manufacturer who uses hazardous materials in toys that will inevitably be put in a child's mouth. Would you purchase such a product if you were aware of this? Of course not! Market your Cradle to Cradle® products as the logical, natural choice, without compromising your existing line of products"*(ElcaMedia 2010/11: 22-23). The Cradle to Cradle learning community publishes about a *"'new functionality': safe and healthy products that encourage people and help them perform better"* (Bor et al. 2011: 28). Herewith only one of the potential primary benefits is named (see Footnote to 2. "Appeal to costumers' self-interest").
- With the statement *"explain processes in a way that they'll be understood",* ElcaMedia stresses the need to educate and empower the consumer (ElcaMedia 2010/11: 21).

What is missing in ElcaMedia's elaborations is the communication of the C2C services. The marketing strategy should change the consumption behavior (you

[39] 07th Feb 2012 – Braungart.C2C in the lecture series "future thinking" at Planetarium Hamburg.
[40] *"Doing what's right [producing eco-effective products] is a great step forward, but in today's competitive world I am very aware that it is equally important that Cradle to Cradle is communicated to your various audiences in the right manner in order for it to be profitable."* (ElcaMedia 2010-2011:) it says in the Braungart's foreword of the ElcaMedia PDF which is free to download and outlines their general C2C communication approach.

don't consume a TV, you just want to use it). *"Services can be offered in many innovative ways: providing the product as part of a service; replacing a product, partially or completely with an electronic service; or substitute knowledge, wholly or in part, for physical product"* (Ottman 2011: 101).[41]

Price: Taking into account, the supreme quality and safety arguments of C2C products as well as the putative initial investments in C2C, the application of the premium price strategy would be justifiable. Nevertheless the price strategy should be aligned with distribution channels and selected target group rather than with the communication strategy. Ottman underlines with the example of Whirlpool's CFC-free refrigerator: *"They just misjudged consumers' willingness to pay a 10% premium for a product with environmental benefit that many did not appreciate"* (Ottman 2011: 112). Villiger et al. point out that being trapped in the eco-niche is a vicious circle of high production costs, high sales pricing, low order quantities which result in low revenue that in turn raise the costs (Villiger et al 2000: 200). They advise a moderate penetration pricing in order to convince the "mainstream" consumer with lower willingness to pay and signal quality to the conscious consumers at the same time (Villiger et al 2000: 48, 307).

Public Relations: *"Cradle to Cradle® has all the right credentials for being attractive to the media… Be proactive in creating win-win situations for yourself, the media and your shared audiences"* (ElcaMedia 2010/11: 35). *"Implementing C2C generates automatically free publicity, a cheap and highly effective way of reaching target groups. This should be take advantage of for marketing communication. The own company's representatives may be invited as speakers at conferences and seminars about sustainability to tell their 'story' to the target audience of managers and directors"* (Bor et al. 2011: 20).

(Political) Power: Governments (of the Benelux countries) support companies that embrace C2C and highlight their significance as role models for ecological production. Further they invest public procurements into C2C projects (Braungart and McDonough 2008a:8-9).

[41] Besides - it seems like Braungart and McDonough created even a communication strategy for the purpose of spreading the C2C idea. Unlike other scientists they use "catchy" metaphors and provoking language. In the preface of the German C2C book Braungart warns the German reader that its narrative character might occur too "unserious" for a scientific topic (2002a: 13). Thereby the C2C founders are appealing a broad peer group of designers and top managers instead of chemists and sustainability scientists. Apparently with success as C2C is widely discussed, even though there exist to date "only" round about 500 C2C certified products (MBDC 2012b).

3.6 Critical Perspective

The literature study identifies the following inherent scientific conflicts within the C2C design concept.[42]

- 100% closed loop recycling of technical nutrients is a scientific lie.[43]
- The two nutrient cycles lead to waste treatment confusions.[44]
- The environmental benefit of biological nutrient addition is questionable. Biological nutrients are not intrinsically good or healthy, but may have negative impacts on the environment (Reijnders 2008).
- C2C "condemns" eco- efficiency too generally, not reflecting their compatibility under certain circumstances.[45]
- C2C has no critical perspective on existing economic system and neglect the rising economic costs of material reflecting their rareness.[46]
- The omission of energy consumption caused by the abundance philosophy with endless renewable energy: C2C does not imply reduction energy consumption. Even though energy-intensive processes are cost intensive threats to companies (Lidtke 2009: 67).

[42] The following exposition is intentionally kept short.

[43] *"100% closed loop technical recycling is identified to be thermodynamically impossible." "It exists only very slow downcycling. Also technical nutrients wear out and disperse into the environment during use."* (Quoted from Anders, based on Reay et al.2011:).

[44] "*The fundamental distinction between technical and biological nutrients is problematic since the definitions are not mutually exclusive, leading to confusion on appropriate waste treatment."* (Anders 2011: IV) "*The dualistic concept of dividing materials into biological and technical nutrients is simplistic and should be abandoned for something which better reflects the complexity of reality. The illusion of 100% closed loop systems leads to the acceptance of toxic substances within technical nutrients. This loophole should be closed by formulating a 'Clear Statement on the Handling of Hazardous Substances'"* (Quoted from Anders 2011:11; elaborated from van Zyl 2010: 28).

[45] *Method Laundry Detergent is an example of a product where combining the eco-efficiency concept and the Cradle to Cradle concept does not result in a conflict. The Cradle to Cradle concept does not prohibit the use of enzymes, since they are naturally occurring and was proved to have close to no contribution to the eco- and human toxicity of the detergents. However since the Cradle to Cradle concept does not focus on reducing energy consumption it also does not encourage the use of enzymes in detergents. Therefore the inclusion of enzymes in Method Laundry Detergent should be seen as an Eco-efficient initiative."* (Anders 2011: 127)

[46] *:"Although some critical remarks regarding the current economic system or the paradigm of constant growth can be found in the publications of Braungart and McDonough, no suggestions are offered on how these system-inherent failures" (van Zyl 2010: 8). "Driving materials into rareness is not punished but awarded by the economic rationale. Rare materials are economicly more valuable (Knappheitskalkül; Hofmeister 1998:.32)"* (van Zyl 2010: 28).

- Being labeled with the best certification level, Platinum, guarantees only 25 percentage of optimal ("A and B-rated") ingredients (Lidtke 2009: 67). Moreover Platinum has so far not even been reached by any product.
- The C2C literature does not pass on recommendations or experiences for an appropriate C2C marketing-mix. Likewise the networks of practicing companies do not report on this issue in detail - neither the C2CNetworks's brochures "Perspective Study: Industry" and "Good practice handbook (draft)", nor the Cradle to Cradle learning community's booklet "Cradle to Cradle pays off!", while ElcaMedia's online reader "enable more // cradle to cradle®" is focusing exclusively on the communication strategy (Vezzoli et al. 2010; Sips and Kuppers 2011; Bor et al. 2011; ElcaMedia 2010/11).

4 Provisional Result and Presumption

Even though the present study is dominated by explorative characteristics, first presumptions on the challenges and chances of the C2C design concept for companies arise from the former chapters. Those "desk-research" assumptions do not replace the hypotheses resulting from the interviews. Moreover they serve on the one hand to structure the interviews based on theory (cp. 5.2). On the other hand, they build the foundation for categories of the analysis method (cp. 5.3).

According to literature study the decisive moments for companies embracing the C2C are the "technical" implementation process (cp. 3.2) and the product launching for which a marketing-mix is needed (cp. 3.5). Bearing in mind the Triple Top Line promise (cp. 3.4.1) the presumption can be drawn that C2C resulst mostly in benefits. Regarding the economic performance C2C may lead to savings on the long-term, although the literature doesn't provide information about eventual initial investments. Higher demand additionally stimulated by planned obsolescence would generate sales revenue. There might be further the chance to gain market leadership through innovation. Furthermore savings may result from modular design and, in case that the technical implementation succeed, material cycles would save material cost (cp. 3.4.2). From social perspective, long-term relations to the costumer could be build up by services that place the end-user's ownership of the product and tightened by shared values (cp. 3.4.2). Within the company, once the C2C standard is achieved, the informed employees may work with the motivation of supporting "good industry". Notwithstanding, the precondition, that all suppli-

ers share willingly their knowledge about the chemical characteristics (cp. 3.2), has to be regarded as challenging. Consequently is might be a challenge to find suppliers that provide such high environmental performance. The use of eco-effective ingredients may be a benefit from ecological standpoint as well as the opportunity to comply thereby with upcoming environmental regulation. Further it is expected that the closure of the nutrient cycle (Step 5 of the implementation process) bears difficulties. Aesthetic design and functionality are esteemed to be a visible added value, providing the opportunity to target a broad costumer group. Based on the vague definition, the realization of "design that follows evolution" is considered as challenging. Likewise the sharp distinction between eco-efficiency and eco-effectiveness (cp.3.3) may imply that it is a challenge to combine C2C with other sustainable design approaches. Conducted from C2C's broad understanding of design (cp. 3.4), the design of service and new business models offers the path-breaking opportunity to introduce circular economy (cp. 3.4.2).

While launching the C2C product, the marketing decision to include a deep product line or even exclusively C2C assortment is reckoned to be a chance, bearing in mind the success of Desso (cp. 3.5). As the C2C product should be aligned with the mass market expectation, the premium price might be hindering. To generate, even though, revenue by volume, a positioning in the mass markets should be aspired. B2C target groups are regarded to provide obstacles for the C2C manufacturer because e.g. communicating the added value is a challenge with retail as transmitter. In contrast, B2B target groups make purchase decisions with higher involvement and order putatively higher volumes. Generally it is questionable, whether the challenge of educating the target group about C2C should be accepted. Rather it seems to be common sense to communicate the added values "quality and health" even though there are more options. The C2C service concept inheres the challenge to promote the new "leasing-attitude". As the C2C certification signals mainly a certain molecular standard and does not claim to be a label of high recognition, it might be an obstacle to rely on the labeling function in order to stimulate purchase decisions. However, it can be assumed that engagement in C2C goes along with free publicity and the chance for a company to serve as a role model for governmental decisions.

QUALITATIVE STUDY

5 Methodology

The realized research has been carried out in May 2012. The empirical method of qualitative interviews based on interview guideline has been chosen according to the central research question - which obstacle and opportunities of C2C the sample companies have been experienced and which marketing-mix was applied. To specify, exploratory expert interviews were conducted in order to gain undetermined, in-depth insights into two companies and to extract hypotheses on the research question. Thus, the interview material has been analyzed due to the qualitative content analysis by Mayring. Jenny Pfau, geoecologist and building biologist at EPEA Hamburg, operated as “gatekeeper” and recommended a pre-sample of six C2C applying companies for the empirical research. Three interviews have been carried out with experts from two companies with durations varying between 21 - 48 minutes. The phone interviews were conducted via the online phone call program Skype™ and audio recorded with the application “Call Graph 1.3.0.0”. The audio data can be found attached (on the CD).

5.1 Research Sample

In consideration of the limited scope of a bachelor thesis and the ambition to go thematically deeper than quantitative surveys, the number of interviewed companies is limited to a sample of two. It is neither the aim of this study to compare the two companies with each other, nor to map the totality of all C2C businesses entirely, rather than to explore the experience of two explicit examples. For the purpose of preliminary determination, criteria are set to the sample structure before sampling. So, the sample results are selected *“intentionally”* and *“reasonable”* (Mayer 2008: 39). The first criterion clearly defines the scope of the study to the economic area of interior design. This field offers in Europe already several C2C companies as mentioned by J. Pfau and product design plays an important role within this product category. The second selection criterion was the idea to cover the two product types of the Cradle to Cradle design concept: One product for the biological and one for the technical cycle (cp. 4.2). To take into account the different levels of experiences and the heterogeneous individual economic situation, the sample represents as third criterion "old hands" as well as “newcomer”.

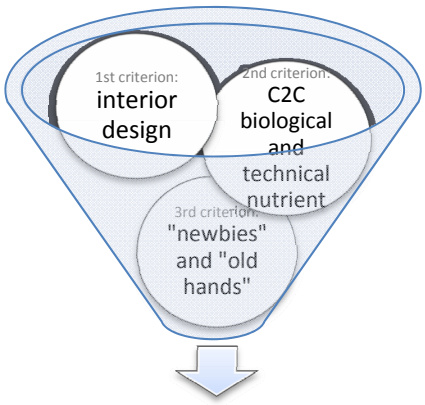

Figure 15: Sampling criteria applied to a list of recommended companies (own Figure).

These three criteria were applied to a list of possible businesses composed by Jenny Pfau. The European branch of Steelcase Inc. with numerous C2C products and the Belgium family company Jules Clarysse with one C2C product launched recently, resulted to match best (as illustrated in Figure 15).

- **Steelcase Inc.,** world's leading office furniture producer with $2.4 billion annual revenue in fiscal year 2011. Headquartered in Grand Rapids, USA, Steelcase developed in cooperation with MBCD from 2002 until 2004 the office chair "Think" which was the first ever Cradle to Cradle certified product (Braungart and McDonough 2009: 55; 157-162) The company is horizontally integrated and has worldwide 25 plants. The company is certified with the management systems for quality (ISO 9000) and for environment (ISO 14000). In order to help people having a better work experience by providing products, services and insights into the ways people work, Steelcase invested $115 million in research, design and development activities over the past 3 years and is holder of more than 1,300 active patents and design registrations worldwide. The company designs and manufactures architecture, furniture and technology products with deep and long-term commitment to Cradle to Cradle and sustainable development (see Exhibit 4 for all certified C2C products). On recommendation of the marketing coordination of the Dutch branch, the group on design for the environment of the European headquarters was contacted. The interview was conducted with Hélène Babok, director for sustainable development, Europe (Steelcase 1996 -2012a).[47]

[47] All interviewees agreed on being recorded and quoted with name.

- **The weaving Jules Clarysse** is a manufacturer of terrycloth and kitchen textiles in Europe. In the area of terry towels, Jules Clarysse implemented fair trade and became leader of the market. This development continued including GOTS-certified organic and soy fiber towels. Founded in 1953 with headquarters in Pittem, Belgium, the company is today still a family business. The company is vertically integrated and has over 400 employees. Jules Clarysse has a turnover of 50 million € annual, primarily in European markets which corresponds with the average daily production of 100,000 towels. The interviews were conducted with Norbert Stegemann, salesman for the German branch and Peter Bauwens, director of sales and marketing (Jules Clarysse 2011a).[48]

5.2 Research Method: Expert Interview

In qualitative research, the expert interview is the most common source of information origination. For this study, the expert interview due to the definition of Mieg and Näf has been chosen as interview type because of their focus on sustainability research. Though, the method of expert interviews meets also broad acceptance among professionals within social research as well (Bogner et al. 2005: 7). Due to Mieg and Näf, the method is used to collect *"special knowledge"*. This data collection is to be applied in case that an answer to the central research question cannot be deduced from literature. Then, present knowledge or the experienced assessment of professionals is needed (Mieg and Näf 2006: 1). Thereby an expert is defined as someone who possesses long-term experience about a specific knowledge or abilities (Mieg and Näf 2006: 10). Lamnek adds to this definition, observations on the psychological effect of the expert status. He predicts the data collection to be easier, the more the interviewee is assured by the interviewer for her/his expertise (Lamnek 2010: 354-355). Referring to Bogner et al. there are three types of expert interviews differentiated by its function: the exploratory, the systematizing and the theory generating one (Bogner et al. 2005: 36). As indicated in the subtitle, the present thesis bases on exploratory expert interviews. These are used to cover new ground of complex topics. Researchers seek thereby to structure the investigation area thematically, to approve presumptions and generate

[48] All interviewees agreed on being recorded and quoted with name.

hypotheses. At the same time the experts can be both - information origin and investigation object (ibid.: 37).

Interviews in general may have an open-ended, semi-structured, structured or survey character (Lamnek 2010: 307). As common for problem-centered expert interviews a question guideline is developed to support the interviewer in specifying the questions and leading the answers towards the research question(Lamnek 2010: 332-336),further to give the interviewee in advance a foresight of the outline of the interview (Mieg and Näf 2006: 14). The developed question guideline is of a semi-structured nature. Thus, it consists of open-ended and structured questions. This offers the opportunity to the interviewees to rethink the core content and general topic, to reflect upon it and to link their experiences and perceptions as well as to include new perspectives (Bogner et al. 2005: 177). The interview guideline is a method-mixture: It bases on the presumptions (cp. 4) and literature study (see Exhibit 3 for interview guidelines). In order to give the opportunity for new findings, the guideline is of exploratory nature and the majority of the fourteen to sixteen questions are open-ended questions (Lamnek 2010: 334). Those are used to stimulate narrative report and gain as many details as possible (ibid.: 333). Furthermore they enable the interviewees to answer due to their own frame of reference without being confined by pre-arranged detail questions. In other words, the semi-structure of exploratory research avoids determination through suggestive questions (Lamnek 2010: 310, 333). It is not intended to verify or falsify solely the presumptions summarized in the category system (Exhibit 4; explained further in 5.3). The different amount of questions results from the fact that some questions were adapted or reformulated textually to the companies' profile in order to address the heterogeneous C2C-experience and to demonstrate the interviewer's preparedness. Regarding the formulation of the open-ended questions, social research literature contradicts. For example in the debate about using "how" and no "why"-question. Becker argues that posing a "why" question created defensiveness on the interviewee's part, while a "how" question expressed an invitation to talk without asking for justification (Becker 1998: 58–60). Following Silverman, the interviewer may begin with "how" until "why" – questions are appropriate (Silverman 2008: 391). This advice was followed. Yin stresses the need for empathy on the interviewer's side: *"Interviews require you to operate on two levels at the same time: satisfying the needs of your line of inquiry (Level 2 ques-*

tions) while simultaneously putting forth "friendly" and "nonthreatening" questions in your open- ended interviews (Level 1 questions)" (Yin 2009: 106–107). During the interview conduction, further subsidiary questions were asked individually e.g. in the case of comprehension difficulties or the need for specification. Therefore interviewers may prepare themselves with pre-written additional questions (Lamnek 2010: 319). A certain improvisation is nevertheless imminent to expert interviews (ibid.). In this way the interviewer is able to respond to interviewees and "dig deeper" concerning the own research question. Last but not least, the interviewers' expertise and prearrangement in terms of probing and moderating is a crucial element for a successful semi-structured interview (Bogner et al. 2005: 126; Mieg and Näf 2006: 23). Thus, the interview guideline was send via e-mail to the interviewees two weeks ahead of the actual interview appointment; further queries and privacy policy questions regarding the audio recording were clarified before. In accordance with Mieg and Näf, the interviewer ran a pretest on the interview guideline and noted as first evaluation all feelings and reactions in ad-hoc postscriptum directly after the interviews (Lamnek 2010: 335; 357).

5.3 Analysis Method

With explicit permission of the interviewees; the phone interviews have been audio recorded (this data is attached on the CD-ROM). As evaluation method the common qualitative content analysis by Mayring has been chosen since the interviews serve to set up hypotheses and not to verify existing hypotheses (Mayring 2010: 13). Mayring does not define his content analysis, but characterizes it as analysis of fixed communication in a systematic manner. This systematic obeys pre-set rules and bases on theoretical work (ibid.).

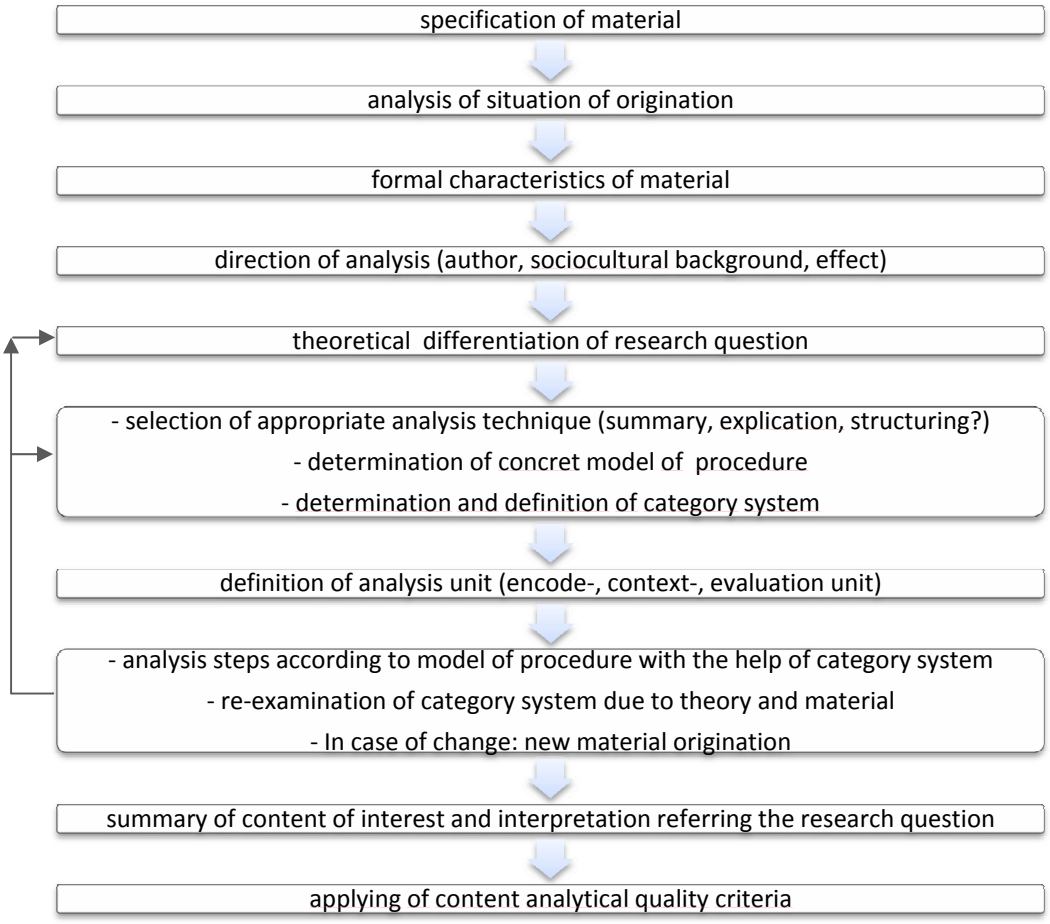

Figure 16: General model of procedure of the content analysis (own translation of Mayring 2010: 60).

The first five steps (Figure 16) of the general model of procedure of the content analysis (from sampling until specification of the research method and theoretical differentiation) have been described in the previous chapters. As analysis technique the structuring technique is applied to the material (Mayring 2010: 93-110). Neither the summarizing technique, nor the context analysis within the explication technique would expedient to answer the present line of inquiry. Contents of interest in the material are labeled with the caption of particular interview and time notes. Mayring differentiates the structured content analysis in four subcategories: the formal, content based, typecasted and scaling structuring (Mayring 2010: 66). Since it was objective to the analysis to filter certain themes, content, and aspects regarding the research question out of the material, it has been worked according to the *sequential steps of content structuring* (Mayring 2010: 98; see Figure 17).

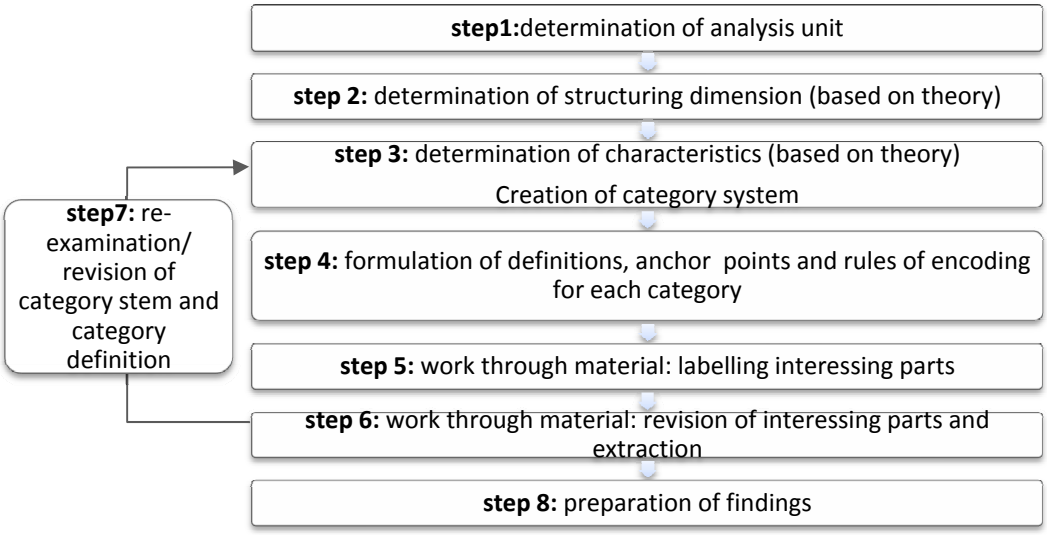

Figure 17: Model of procedure of the structured content analysis (own translation of Mayring 2010: 93).

As shown in Figure 17 (step 3) *categories and subcategories* are developed following the procedure of inductive category (Figure 18). These comprise the contents that were to be explored in the interviews: The experienced opportunities and obstacles during the implementation of the Cradle to Cradle design were subcategorized in a reality check of the Tripe Top Line, the role of aesthetic design and service design. Furthermore presumptions for marketing-mix for C2C were listed. The resulting category system, as explicit tool of the content structuring, is set up as a document that has to be continuously revised (attached as Exhibit 5).

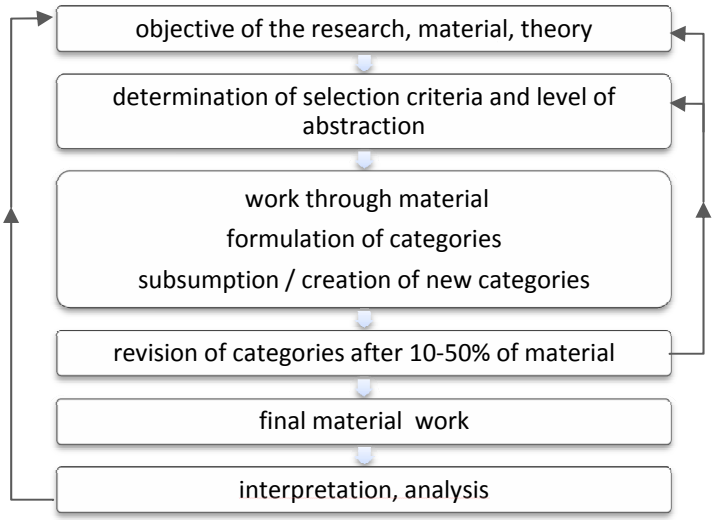

Figure 18: Model of procedure of the inductive category (own translation of Mayring 2010: 84).

The next step is the extraction of the contents of interest, and then the material is paraphrased. Firstly, it is subsumed due to the subcategories, secondly to the major cat-

egories. Thereby Mayring's rules for summarizing have to be followed (2010: 67-84). The diagram below displays this procedure:

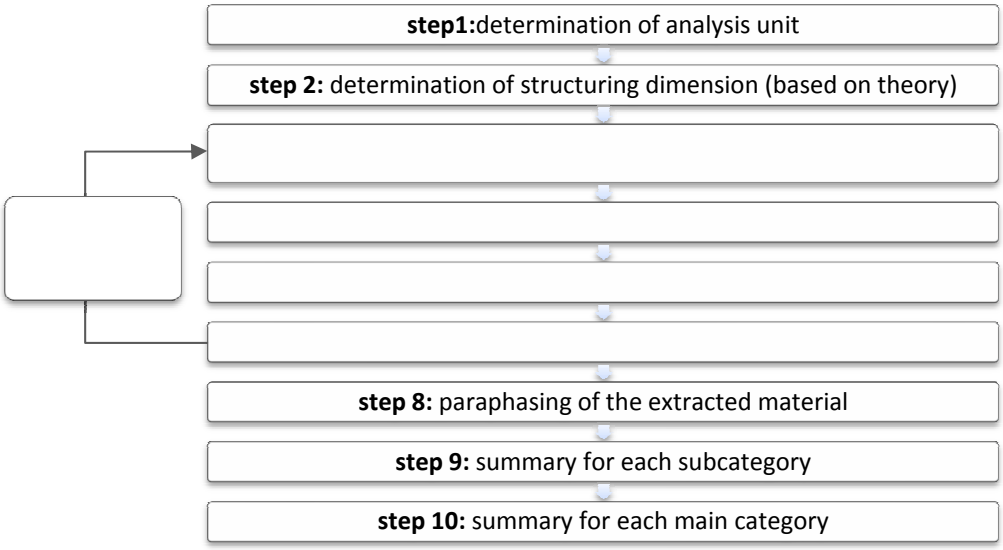

Figure 19: Model of procedure of the structured content analysis in comparison to the general one (Figure 16) (quoted from Mayring 2010: 99 (own translation)).

Finally, after 10-50% material extraction, the category system is re-examined and reviewed against literature study and interview material as described in Figure 18. The results are to be interpreted in regard to the research question. The next chapter presents the findings. The category system resulted to check whether the implementation of C2C resulted for Jules Clarysse and Steelcase EU in Triple Top Lines and how the broad design opportunities are applied. Furthermore it evaluates which marketing-mixes have been chosen and whether these lead to the assumed chances and challenges. The reference of the different personal judgments are audio-quoted with indication of surname and time (h:min:sec).

6 Content Analysis

Babok from Steelcase emphasizes that the material chemistry analysis is the stone of C2C, while the way to turn C2C into benefits is via communication in order to sell the added value (Babok I: 00:02:18). Therewith the presumed main categories are proved to be the core area of chances and challenges of C2C from the standpoints of companies Steelcase and Jules Clarysse. The detailed content analysis can be found attached (Exhibit 6).

6.1 Findings

The following Figures 20 and 21 sum up the hypotheses developed from the content analysis:

Chances and Challenges of C2C during Implementation		
Presumption	Jules Clarysse	Steelcase
Initial investment/ long research = Challenge	Challenge	Challenge
Long-term savings = Chance	-	Challenge
Modular design savings = Chance	-	Chance
Market leadership/ innovation = Chance	Chance	Chance
Profitable closed nutrient cycle = Challenge	Challenge	Challenge
Rising sale = Chance	Challenge	Chance
Planned obsolescence = Chance	Chance	-
Supply chain knowledge sharing = Challenge	Challenge	Challenge
Employee motivation = Chance	Chance	-
Long-term consumer relation = Chance	Chance	-
Shared values with consumer = Chance	Challenge	-
Research for supplier = Challenge	Challenge	Challenge
Environmental legal compliance = Chance	-	Chance
Effective ingredient choice = Chance	Challenge	Challenge
Closed nutrient cycle = Challenge	Chance	Challenge
Relation C2C & sustainable design = Challenge	Chance	Challenge
Form follows evolution = Chance	-	-
Visible “aesthetic design & functionality” value = Chance	-	Chance
New business models/ service design = Chance	Chance	Challenge

Figure 20: Summary of the Content Analysis I (- : no findings or not applicable)(own Figure).

Norbert Stegemann, Peter Bauwens from Jules Clarysse and Hélène Babok from Steelcase agree on the innovation generating effect of C2C and the chance to extend market leadership. For both companies, the search for C2C compatible suppliers was challenging. But, as Jules Clarysse’s product consists of far less components than Steelcase’s, they overcame the challenge easier. Regarding the possibility for the C2C aim of closing the nutrient cycle, the companies disagreed. Again the Europe-wide operating Jules Clarysse see a way to manage material recovery, while worldwide operating Steelcase has to find suboptimal regional solutions. In both cases, one cannot speak of obvious benefits deriving from the closed cycle (e.g. own re-use or cash value from material re-sell) rather than im-

measurable advantages. Jules Clarysse seeks to use the take back service to strengthen long-term customer relations, which in turn generate constant revenue through the service inherent "planned obsolescence". From this perspective the cycle might be profitable.

Chances and Challenges of C2C for the Marketing-Mix		
Presumption	Jules Clarysse	Steelcase
Product line broadening = Challenge	Challenge	Chance
Placement mass market = Chance	Chance	-
Market position: premium price = Challenge	Challenge	Challenge
Target group: B2C mass-market = Challenge	both	-
Target group: B2B = Chance	both	both
Added values "quality & health" = Chance	Chance	Chance
Communicating concept of service product = Challenge	-	Challenge
C2C Certificate labeling function = Challenge	Challenge	-
Educate target group about C2C = Challenge	Challenge	-
C2C high publicity = Chance	Chance	-
Role model for legislature = Chance	Chance	-

Figure 21: Summary of the Content Analysis II (- : no findings or not applicable)(own Figure).

Jules Clarysse so far hasn't developed a communication for their service offer but definitively they could elaborate it as marketing differentiator. Hereby should be noted that Steelcase already experienced that stimulating the client to return the product actively is a challenge. Both companies are aware that closing the cycle implies logistics that can only be handled in cooperation with local waste managers.[49]Aiming for broad mass market, Steelcase and Jules Clarysse are pricing their product competitively and communicate the primary added value (aesthetics, functionality, health, service or consumers' cost saving) in addition to the environmental benefits. As to benefit from economy of scales they are targeting preferred B2B costumers, but also high volume retail to B2C. Combining C2C with other sustainability approaches appears to be easier for *products for consumption* (Jules Clarysse's towel is even obliged to consist of organic cotton) while *products of service* inhere the struggle to communicate the eco-effective and eco-efficient advantages (Steelcase solved this for the "Think" by illustrating in a brochure its LCA impacts and the C2C cycle (see Figure 13 and 21)).

[49] Besides it should be noted that the C2C philosophy hinds the fact that products for consumptions should be handed back for industrial composting.

6.2 Evaluation of the Method

Regarding the constraints of the method it is notable that the method-mixture of exploratory approach combined with theory and presumptions of structuring has a high potential for errors. Reflecting the methodology of content analysis by Mayring it is acknowledged that it is one of the most common methods to evaluate interviews. Anyway, Gläser and Laudel criticize the content analysis: The category system disabled the finding of relevant as it bases only on 10-50% of the material (Gläser and Laudel 2009: 198- 199). Moreover personal face-to-face interviews are preferable in order to reach quality and depth (Schnell et al. 2011: 367). The present interviews were carried out in passing via phone while driving car or taking the train. Nevertheless, as advantage of the phone interviews turned out that these are timely flexible enough to fit into the full schedule of businessmen. It resulted to be "low-threshold" enough that all three contacted people approved to take their time off. Luckily, all interviewees demonstrated a high willingness and commitment to share their insider-knowledge on C2C. The predicted duration of half an hour was exceed twice by round about ten to fifteen minutes and undercut once by ten minutes. Furthermore, it was not taken into account that the alleged objective responses of the experts always represent as well subjective options of individuals. Consequently, based on estimation of one or two persons it can be only limitedly concluded on the situation of the whole company. To counteract this it was intended to interview three interdisciplinary experts of each company. This could not be realized due to lack of time and the fact that interview requests are always forwarded to mainly marketing experts. Unintentionally, the research sample contains a further differentiating character of the two companies. The fact that they differ in their type of management (horizontally and vertically integrated) resulted in a further insight of the weaknesses of C2C.

7 Future Work

The developed hypotheses should be processed by further research. For example they should be discussed before the background of e.g. contemporary marketing literature on sustainable products. Based on the gained knowledge of C2C in practice, the question arises how to analyze whether how C2C pays off economically and how to handle supply chain management within horizontal integrated companies in accordance with C2C. In the interest of sustainable marketing should be

explored, which communication strategies could replace the property paradigm in society by services. From the academic point of view it would be interesting to investigate how the expansion of C2C within a company from one product line to a whole assortment works regarding production transformation, management and employee training. For an improvement of the C2C design concept it would be advisable to rethink how the message of "design for evolution" could be transported to companies.

8 Conclusion

Implementing the Cradle to Cradle design concept is setting high aims to a company. Even though the concept has its weaknesses, it is an intelligent product design approach to re-design industrial production. This study describes the status quo of two practical cases; still vague conclusions can be conducted for several more C2C companies. The interviews of completely different companies showed that a Cradle to Cradle compatible marketing-mix should be developed simultaneously to the third "technical" step of the C2C implementation process while keeping in mind how to avoid the eco-niche. The marketing-mix is a task that decides on the success of the C2C product. In general, marketing for sustainable products is highly up-to-date and widely discussed. Experience exchange within the C2C industrial community and further academic research could facilitate this. It should be considered whether EPEA and MBDC could assist in this matter as well as in the field of service design. In order to meet the C2C philosophy and accomplish full implementation of the fifth step, it is essential to elaborate C2C service designs case-by-case respecting inter alia the current insights from design theory.

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The audio recordings of the interviews can be found at the attached CD.

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Appendix

Exhibit 1

SHARING EXPERIENCE EUROPE
POLICY INNOVATION DESIGN

Case Studies in Design Policy & Programmes

This case study was developed as part of the SEE project. SEE is a network of eleven European partners sharing experience and stimulating debate on how to integrate design into innovation policies at regional, national and European levels.

www.seeproject.org
www.designwales.org

Project secretariat: **Design Wales**
Western Avenue, UWIC, CF5 2YB, Cardiff, UK
www.seeproject.org / info@seeproject.org

Design Ladder

Demark

The Design Ladder was developed by the Danish Design Centre (DDC) in 2003 as a tool to measure the level of design activity in Danish businesses. The Ladder, used as a framework for a survey, was the first step in developing a method to assess the economic benefits of design in Denmark.

The extent to which design may enhance creativity, innovation and competitiveness depends on a company's use of design. The DDC was convinced that design-driven companies were far more likely to develop new products compared with those that were not. Therefore in 2003, to prove their point to industry, the DDC in association with the Danish National Agency for Enterprise launched a survey to assess the economic benefits of design.

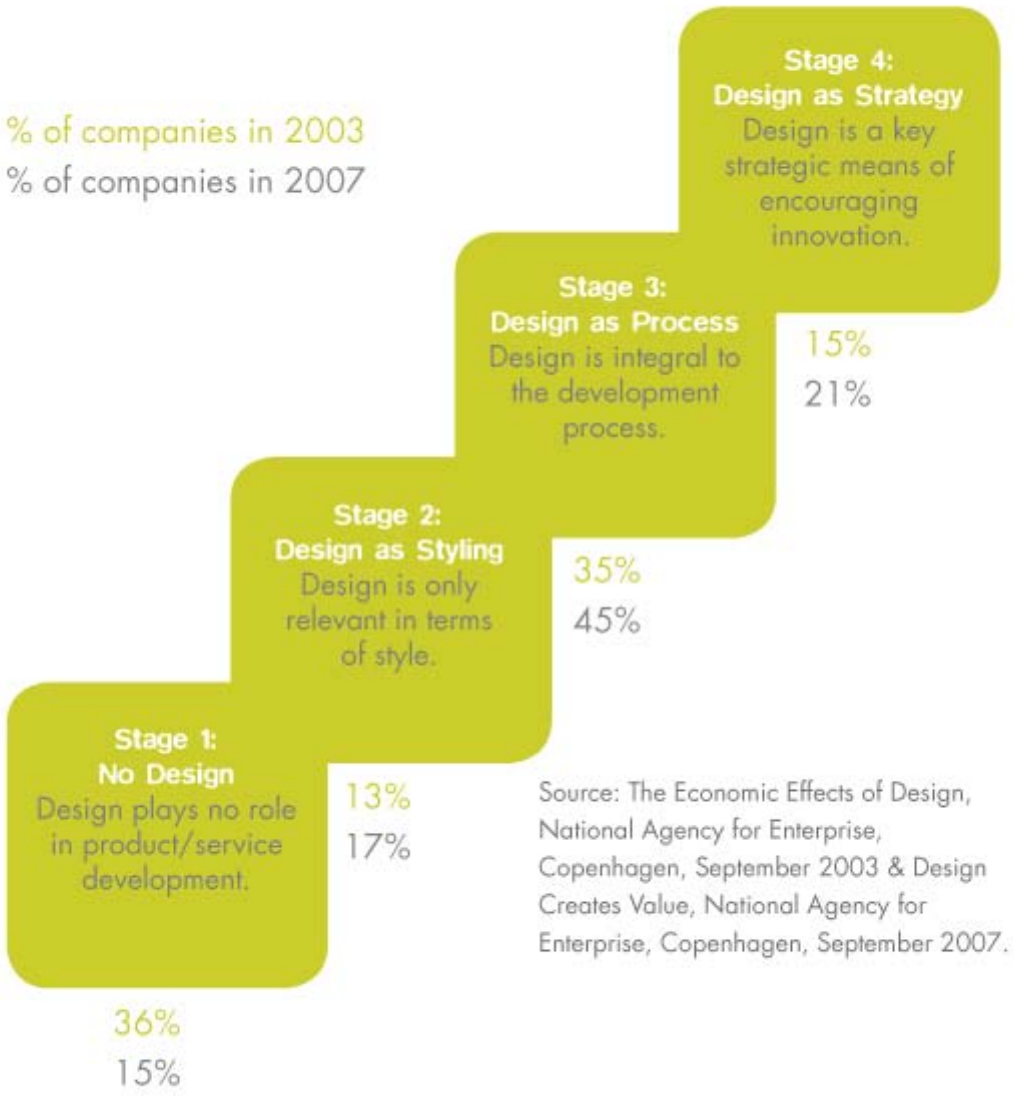
The survey examined the design investment of 1,000 companies chosen from four groups of businesses (10 to 19; 20 to 49; 50 to 99; and 100-plus employees). Companies were categorised into four stages of design maturity depending on their approach to design investment. The higher a company was ranked on the Design Ladder, the greater strategic importance they attributed to design. In order to raise awareness of the benefits of design in industry, it is vital to encourage companies to move up the scale. The DDC has developed a series of courses and training programmes to enable companies to progress including several recently launched modules relating to product branding, design briefing, the design process, new materials and user-driven innovation.

The main conclusions from the survey were that Danish companies invested an annual total of approximately DKK 7 billion (EUR 1 billion) in design. Over the five years prior to 2003, Danish companies that purchased design registered a total increase in their gross revenue of approximately 22% (DKK 58 billion ≈ EUR 8 billion) higher than companies that did not purchase design. Linking performance data with investment in design revealed a correlation between design purchase and economic growth. The DDC intended the survey to serve not only as input for drafting a new national design policy but also to provide solid economic data to support discussions with corporate businesses. Indeed, the survey data was fundamental in demonstrating the importance of promotional activity within design to the Danish government. Consequently, in September 2003, the Danish government adopted a four-year national design policy as one of five new strategic initiatives to promote economic development called Denmark in the Culture and Experience Economy.

The survey was repeated in 2007. By indexing the companies according to the four profiles, the Design Ladder provides an assessment of how many companies actually moved up a rung on the ladder over the course of four years. The result revealed that, between 2003 and 2007, the distribution of Danish companies at stage three of design maturity rose from 35% to 45% and the number of companies at stage four rose from 15% to 20%. The Design Ladder also serves as a model for explaining to companies that design is more than merely product styling; meaning that companies can reflect on their own way to incorporate design into their business know-how.

The Design Ladder is proving to be a successful tool for evaluating design promotion. This comes at a time when the absence of effective indicators to evaluate the economic benefits of design seems to be a major obstacle to discussions on an effective design policy or strategy at the regional, national or European levels. Not surprisingly, the methodology has been referred to and even adopted by initiatives in other European countries including Austria, Sweden and Switzerland. However, it is important to highlight that a key issue for a successful measurement process is a systematic evaluation. Only the collection of data in consecutive periods will provide comparative data and therefore, meaningful results. Consistency seems to be key in the successful development of the Danish method. By assessing how many companies move up a rung on the Design Ladder once design promotion and policies have been implemented, the Danish government has a tangible assessment of the role of design in industry.

The Design Ladder



Design Ladder: four stages of design maturity
Stage One: No Design
Design plays little or no role in product or service development. For instance, product and service development is performed by personnel who are not design professionals. The utility of the end-user tends not to be considered.

Stage Two: Design as Styling

Design is only relevant in terms of aesthetic considerations such as style, appearance and ergonomics. Sometimes professional designer may be involved but styling will be predominantly purchased internally or from professionals in other sectors.

Stage Three: Design as a Process
Design is considered in terms of a process or method in product or service output but is only employed at the initial stages of development. The design solution is procured externally and is adapted to the requirements of the end-user using a multidisciplinary approach.

Stage Four: Design as Strategy
Design is integral to a company's continuous renewal of their business concept as a means of encouraging innovation. The design process is fused with the company's key objectives and plays a role at every stage of development.

For more information please contact: Danish Design Centre www.ddc.dk

9 Certification Criteria Summary Matrix

CRADLE TO CRADLE CERTIFICATION℠ CRITERIA	Basic	Silver	Gold	Platinum
1.0 Materials				
All material ingredients identified (down to the 100 ppm level)	●	●	●	●
Defined as biological or technical nutrient	●	●	●	●
All materials assessed based on their intended use and impact on Human/Environmental Health according to the following criteria: ***Human Health:*** Carcinogenicity Endocrine Disruption Mutagenicity Reproductive Toxicity Teratogenicity Acute Toxicity Chronic Toxicity Irritation Sensitization ***Environmental Health:*** Fish Toxicity Algae Toxicity Daphnia Toxicity Persistence/Biodegradation Bioaccumulation Ozone Depletion/Climatic Relevance ***Material Class Criteria:*** Content of Organohalogens Content of Heavy Metals	●	●	●	●
Strategy developed to optimize all remaining problematic ingredients/materials	●	●		
Product formulation optimized (i.e., all problematic inputs replaced/phased out)			●	●
No wood sourced from endangered forests			●	●
Meets Cradle to Cradle emission standards			●	●
All wood is FSC certified				●
Contains at least 25% GREEN assessed components				●
2.0 Material Reutilization/Design for Environment				
Defined the appropriate cycle (i.e., Technical or Biological) for the product and developing a plan for product recovery and reutilization	●	●	●	●
Well defined plan (including scope and budget) for developing the logistics and recovery systems for this class of product			●	●
Recovering, remanufacturing or recycling the product into new product of equal or higher value				●
Product has been designed/manufactured for the technical or biological cycle and has a nutrient (re)utilization score >= 50		●	●	●
Product has been designed/manufactured for the technical or biological cycle and has a nutrient (re)utilization score >= 65			●	●
Product has been designed/manufactured for the technical or biological cycle and has a nutrient (re)utilization score >= 80				●
3.0 Energy				
Characterized energy use and source(s) for product manufacture/assembly	●	●	●	●
Developed strategy for using current solar income for product manufacture/assembly		●	●	●
Using 50% current solar income for product final manufacture/assembly			●	●
Using 50% current solar income for entire product				●
4.0 Water				
Created or adopted water stewardship principles/guidelines		●	●	●
Characterized water flows associated with product manufacture			●	●
Implemented water conservation measures				●
Implemented innovative measures to improve quality of water discharges				●
5.0 Social Responsibility				
Publicly available corporate ethics and fair labor statement(s), adopted across entire company		●	●	●
Identified third party assessment system and begun to collect data for that system			●	●
Acceptable third party social responsibility assessment, accreditation, or certification				●

Exhibit 3

LEUPHANA
UNIVERSITÄT LÜNEBURG

Interview Request

for a bachelor thesis in the field of

Intelligent Product Design

An exploratory Study on the Chances and Challenges of the eco-effective Cradle to Cradle® Design Concept

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Lüneburg, Germany, the 19th of April 2012

1 Object Of Investigation

The thesis seeks to explore the opportunities and obstacles for companies during the implementation of the Cradle to Cradle® design concept. Therefore I hope to interview different experts from two companies of the Cradle to Cradle® community in the area of interior design.

I kindly ask you to share your experience with me and hope for your cooperation:

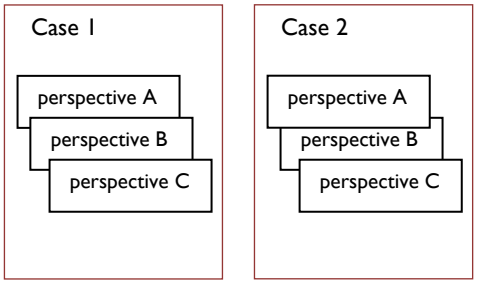
1. Via a short telephone call I would like to find an appointment and clarify details (such as privacy policy regarding audio recording).
2. The interview via telephone itself will take about 30 – 40 minutes.

2 Framing of the exploratory Study

Economic sector: Interior Design

- company 1: "biological product"
- company 2: "technical product"

Three experts from each company in order to reach an interdisciplinary perspective:
e.g.
- (A) Product Development
- (B) Marketing/Design
- (C) Management



In the following you will find the detailed interview guideline. The interview consists of three fields of interest:

In advance I wish to express my gratitude for your assistance! Should you wish any further information, I will be glad to answer you via e-mail or telephone.

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3 Interview Guideline for Jules Clarysse

Details of the company	
full name:	Jules Clarysse NV
legal form:	NV (Naamloze Vennootschap: public limited liability company according to Belgian law)
number of employees:	over 400

1) How many products of your assortment are produced according to the Cradle to Cradle® (hereinafter C2C) methodology?

2) How arose the idea to adopt the innovative Cradle to Cradle Concept to your product development process? When / where has the impetus been given?

Chances and Challenges

3) Can you identify the
   a. economic,
   b. social
   c. and ecological benefits using the C2C method?

4) What were the main
   a. economic,
   b. social
   c. and ecological challenges during the implementation phase?

Economic Aspects

b) Did the implementation of C2C result in any long-term savings?

c) Do you receive state support for the realization?

d) Did the conversion costs hinder the implementation?

e) I read your C2C towel is retailed in ALDI supermarkets. Does this mean Europe-wide? What implies such cooperation?

Social Aspects

f) Did the motivation of your employees improve?

g) Did the dialog with the suppliers intensify?

h) Have there been any objections due to the fact that the C2C idea originated from externals (to be specific, from M. Braungart and W. McDonough and their consulting agency EPEA)?

Ecological Aspects

i) Which ecological advantages would you point out as the most important ones?

j) May I ask what hinders the compostability of the towel? To explain it simple, is it technically only practicable in industrial composting facility?

Role of aesthetic Design

5) What is the product design's role in your company?

6) How do you judge the importance of aesthetic design for sustainable design in general and within the C2C concept in particular?

a) What do think about working together with external design expertise?

Marketing Strategy

7) How does the market position of your C2C products differ from your other products?

8) Who is the target group of your C2C product?

9) How do you communicate C2C to the end user?

a) Is it a challenge for marketing to place a sustainable product into the mass market?

10) How do you communicate C2C to retailers?

11) Did you develop a new business model due to C2C?

a) How do you stimulate material recovery? The material recovery from the end user is complicated, I read in your newsletter that you are working on a leasing system for hotelier sector?

b) How do you communicate the leasing model to the end user?

General Questions

12) Why did you decide to embrace C2C?

13) What would you criticize about C2C?

a) How would you describe the labeling function of the C2C Certification?

14) Is there anything you would like to add? Did you miss a particular question?

Thank you!

4 Interview Guideline for Steelcase

Details of the company	
full name:	Steelcase Inc.–European headquarters: Steelcase S.A. (Société Anonyme)
legal form:	Incorporated Company (according to U.S. law)- EU: Laws of France
number of employees:	10,000 employees worldwide

15) How many products of Steelcase's more than 500 productlines are produced according to the Cradle to Cradle® (hereinafter C2C) methodology? (Michael Braungart mentioned in a recent speech that you had high aims due to the company's anniversary this year.)

16) How arose the idea to adopt the innovative Cradle to Cradle Concept to your product development process? When / where has the impetus been given?

Chances and Challenges

17) Steelcase is the company worldwide with the most C2C certified products. Can you identify the
    a. economic,
    b. social
    c. and ecological benefits using the C2C method?

18) What were the main
    a. economic,
    b. social
    c. and ecological challenges during the implementation/product development phase?

Economic Aspects

b) Result any long-term savings through the implementation of C2C?

c) Do you receive state support for the realization?

d) Did the conversion costs hinder the implementation?

Social Aspects

e) Did the motivation of your employees improve?

f) Did the dialog with the suppliers intensify?

g) Have there been any objections due to the fact that the C2C idea originated from externals (to be specific, from M. Braungart and W. McDonough and their consulting agency EPEA)?

Ecological Aspects

h) Which ecological advantage would you point out as the most important ones?

Role of aesthetic Design

19) What is the product design's role in your company?

20) How do judge the importance of aesthetic design for sustainable design in general and within the C2C concept in particular?

21) Steelcase has a subsidiary design and innovation consultancy (IDEO) and is also known for collaboration with external design expertise such as Glen Oliver Löw who designed the price-winning "Think" office chair. How important are external design inputs?

Marketing Strategy

22) How does the market position of your C2C products differ from your other products?

23) Who is the target group of your C2C product?

24) How do you communicate C2C to the end user?

a) Is it a challenge for marketing to place a sustainable product into the mass market?

25) How do you communicate C2C to retailers?

26) Did you develop a new business model due to C2C?

a) How do you communicate the leasing model to the end user?

27) How do you stimulate material recovery? What means the collaboration with Van Gansewinkel / EcoSmart for the end user?

General Questions

28) Why did you decide to embrace C2C (besides NF Environnement, Blauer Engel, PEFC, E1, Oeko Tex and the European Flower)?

29) What would you criticize about C2C?

a) How would you describe the labeling function of the C2C Certification?

30) Is there anything you would like to add? Did you miss a particular question?

Thank you!

Exhibit 4

Cradle to Cradle certified products

Together with McDonough Braungart Design Chemistry (MBDC), one of the world's leading sustainable design firms, we're assessing all of the chemicals and materials used in our products down to100 parts per million - evaluating them against 19 human and environmental health criteria. As a result, we're forming a cradle to cradle strategy for all of our products.

In its simplest form, cradle to cradle design looks to rid industry of what has become known as "cradle-to-grave" products, or products that are simply dumped in landfills at the end of their useful life. Cradle to cradle design builds on the concept that when a product is at the end of its useful life, it can be reused or recycled to become a resource for a new product.

Employing an innovative approach to sustainability, cradle to cradle certification focuses on Safe Materials, Materials Reutilization, Water Conservation and Quality, Energy, and Social Responsibility. Through this comprehensive and stringent work, we take accountability for our products all the way down through the supply chain and work to reduce the environmental impact of our products.

Steelcase

- Amia - Gold and Silver
- Answer – Silver – *first ever C2C certified powered workstation*
- c:scape - Silver
- EE6 - Silver
- Garland - Silver
- Leap - Silver
- Montage - Silver
- Move - Gold and Silver
- Privacy Wall – Silver – *first ever C2C certified moveable wall*
- Premium Whiteboards - Silver
- Post & Beam - Silver
- Siento - Silver
- Think - Gold and Silver – *first ever C2C certified product*
- Universal Storage – Silver
- 200 Series Storage
- 800 Series Storage
- 900 Series Storage
- Series 9000 Storage
- Avenir Storage
- Context Storage
- Montage Storage
- Answer Storage
- Walden – Silver

Steelcase Surface Materials

- Cogent: Connect – Gold
- Cogent: Geode – Gold
- Cogent: Tides – Gold
- Cogent: Traxx – Gold
- Cogent: Wink – Gold
- Cogent: Trails - Gold

Turnstone

- Groupwork Tables - Silver
- Scoop Stool - Silver
- Tour Workspace - Silver

Designtex

- Climatex Lifecycle (7 styles) – Gold – *the industry's first compostable contract fabric*
- Eco-Intelligent Polyester (4 styles) - Gold
- Alchemy Trevira (6 styles) - Gold
- Charley Harper Collection (3 styles) - Silver
- Regeneration 100% Post-Consumer Recycled Polyester (5 styles) - Silver
- Other Certified Recycled Polyesters (16 styles) - Silver

PolyVision

- e3 Ceramicsteel Surface - Silver
- e3 Ceramicsteel Surface (Europe) – Silver – *first international C2C certified product*
- eno Interactive Whiteboards – Silver – *first certified electronic product*
- eno click - Silver
- eno mini - Silver

As of 2/5/2010

- VC Boards France - Silver
  - Classic G Series Marker & Chalk Boards
  - SB Series Marker & Chalk Boards
  - Basic G Series Marker & Chalk Boards

- VC Boards Denmark - Silver
  - C Series Marker & Chalk Boards
  - F Series Marker & Chalk Boards

Details

- Details Eyesite
- Worktools
  - Binder Holder - Silver
  - Cable Rings - Silver
  - Double Square Dish - Silver
  - Letter Trays - Silver
  - Pen/Pencil Cup - Silver
  - SlatRail* - Silver
  - SlatRail Stanchions* - Silver
  - Slatwall Tiles* - Silver
  - Universal Shelf – Silver
  - Hanging Brackets - Silver
- Enviroboard Assembly – Silver *– world's first C2C certified keyboard assembly*
- 19" Keyboard Assembly – Silver *– world's first C2C certified keyboard assembly*
- Stella - Silver
- SOTO Worktools (boxes only)

Nurture

- Viridian Casegoods – Silver *– first C2C certified healthcare product*

The Details SlatRail and SlatWall Workstools have 11 individual certificates, but are counted as one product offering.

Category System for Content Analysis

Main category	Sub category	Presumption
1. implementation of C2C		
	1.1. economical perspective	
		1.1.1. initial investment/ long research = challenge
		1.1.2. long term savings = chance
		1.1.3. modular design savings = chance
		1.1.4. market leadership/ innovation = chance
		1.1.5. profitable closed nutrient cycle = challenge
		1.1.6. rising sale = chance
		1.1.7. planned obsolescence = chance
	1.2. social perspective	
		1.2.1. supply chain knowledge sharing = challenge
		1.2.2. employee motivation = chance
		1.2.3. long-term consumer relation = chance
		1.2.4. shared values with consumer = chance
	1.3. ecological perspective	
		1.3.1. research for supplier =challenge
		1.3.2. environmental legal compliance = chance
		1.3.3. effective ingredient choice = chance
		1.3.4. closed nutrient cycle = challenge
	1.4. role of aesthetic design	
		1.4.1. relation C2C & sustainable design approaches = challenge
		1.4.2. form follows evolution = chance
		1.4.3. visible added value “aesthetic design & functionality” = chance
	1.5. role of service design	
		1.5.1. new business models/ service design = chance
2. marketing - mix		
	2.1. broad C2C assortment = chance	
	2.2. placement mass market = chance	
	2.3. premium price = challenge	
	2.4. communicated added values “quality & health” = chance	
	2.5. target group: B2C mass-market = challenge	
	2.6. target group: B2B = chance	
	2.7. educate target group about C2C = challenge	
	2.8. communicating concept of service product =challenge	
	2.9. C2C Certificate labeling function=challenge	
	2.10. C2C high publicity = chance	
	2.11. role model for legislature = chance	

CONTENT ANALYSIS IN DETAIL

I Implementation of C2C

Regarding the implementation of C2C within Steelcase and Jules Clarysse, one has to keep in mind that these companies differ from mainstream industry as they both anchored the model of sustainability in their business philosophy before they embraced C2C.

I.I Economic Perspective

1.1.1 Initial investment: There are first investments to be made that *"change drastically the way you do things"* (Babok I: 00:01:59). The biggest investment of C2C is the material chemistry analysis (Babok I: 00:02:18). Jules Clarysse's infinity towel took two years of development *"without selling, without having success"* (Bauwens II: 00:10.19). Jules Clarysse calculates the initial investment of time, money and engery to be amortizes within three years (Bauwens I: 00:11:44).

1.1.2 Long term savings: The financial effects of C2C are "*difficult to evaluate, because it is an uncertainty over time"* (Babok I: 00:05:59). Anyhow, by adding the C2C attributes, you ensure over time the desirability of your product and after a few years it might pay off (Babok I: 00:06:06). *"Honestly I don't think we are a pioneer. I think we are under-sophisticated on the financial tools to really be able to track what it tributed to C2C and what to others"* (Babok II: 00:0:12). *"You become innovative in some way, you start thinking differently and then you might be ending up with some cost reduction through choosing different materials, choosing less materials and having lighter products"* (Babok I: 00:03:36). That helps Steelcase to drive the costs down (in some area) and ensures that they don't have to demand premium on their product (Babok I: 00:04:48). Basically financial arguments are difficult to make. It is a matter of standing, judges Babok. There are direct costs that can be decreased due to clever production assistance, distributing systems and material use (Babok II: 00:00:52). By doing that kind of environmental improvements Steelcase limits the risks from either debits resulting from upcoming environmental regulation or the fact that they protect their customer base (Babok II: 00:01:08). This is a cost today, but a cost avoidance tomorrow (Babok II: 00:01:50). *"It is difficult to make a business case. A finance person is always looking on what is going on at the end of the week and you are changing something that is*

ahead three, four, five years from now" (Babok II: 00:02:01). There is a high level of uncertainty because one never knows how quick those regulations will come, what the level of adoption among the customer base is (Babok II: 00:02:11). Babok names Steelcase's PVC story as example. They announce in 2007 to get out of PVC and *"people were laughing at us"* (Babok II: 00:02:21). But in the last two years, PVC-less production became really an argument and criteria in the tenders of their clients (Babok II: 00:02:35). *"It is taking time to pay off. When you don't have regulation it is even longer"* (Babok II: 00:02:43).

1.1.3 Modular design savings: The reason for the success of Steelcase's "Think" rooted from a compilation of different aspects (Babok II: 00:03:48). First the design was innovative. The chair was much lighter than anything comparable before and this was a visible advantage. The disassembly criteria was really object to design and at least in Europe (Babok refuses to speak for the USA) the fact, that the product has been designed to be dismantled, made a big argument (Babok II: 00:03:51).

1.1.4 Market leadership/ Innovation: "*When you are starting a design philosophy like C2C, it forces you to be innovative, not only regarding the material chemistry aspect but also in respect of the end-of-life"* (Babok I: 00:03:01). Jules Clarysse's towel is the first C2C product in the European market, while in other sectors competition already exists. Stegemann assures, that to his knowledge at least in Europe their product is the only 100% biological degradable terry towel. Further he is not aware that any other manufacturer strives for this *"quite extensive C2C certification"* (Stegemann: 00:02:55). Both companies affirm therewith the question whether they are market leading.

1.1.5 Profitable closed nutrient cycle: Is Jules Clarysse able to generate additional revenue from their discarded towels as Kälin claims it to be possible for products of the biological cycle (cp.3.4.3)? They do not receive revenue for their material even though they are having a contract with waste manager Van Gansewinkel. *"No, they don't pay for material. It is almost so that we would pay for the recycling, but we don't do that."* (Bauwens II: 00:15:58). Bauwens explains that the responsible peple have shifted Van Gansewinkel in the position of a raw material company rather than a waste managing. Jules Clarysse does not take the processed material back. *"We use it as a service to the costumer that we take back the old goods"* (Bauwens II: 00:16:20). Babok criticizes that the closed nutrient cycles cannot be performed by every industry. Steelcase, being a non-vertical industry, has factories in which components from many different suppliers are only assembled. There, the employees of Steelcase indeed paint, carry out retreatment, cut woods, glue components together or sew

fabrics "*but that's about it"*. Only for the "Amia" line Steelcase has 65 "tier 1 suppliers". Behind whose are in turn many others more (Babok II: 00:19:54).

1.1.6 Rising sale: *"We don't have forecasts in term of sales that are only tributed to the environmental benefit of the product"* (Babok I: 00:04:51). Definitely, when Steelcase introduced "Think" in 2004, C2C helped a lot to sell the product. Now, its life cycle is there and it is seven years old. So, C2C is not a lifelong guarantee for revenue (Babok II: 00:03:12). A counterexample is Steelcase's silver C2C certified "Amia" seating product which is available in the USA and Europe. It does not result to be a top seller, because from function and design standpoint it is positioned in the niche for the European market. (Babok I: 00:05:09). In such cases the only think one can do is to ensure that the C2C products tackle a new market niche and increase sales revenue on the short term (Babok II: 00:03:09).

Figure 22: The Amia™ Chair by Steelcase (quoted from Petersen 2008).

1.1.7 Planned obsolescence: Bauwens perceives C2C as a production development philosophy that, in a way, stimulates consumption and production because everything is not "downcycable" but recyclable. So there is no problem at all to produce more. In the ancient way of production, the left wing, the green parties, and the industrial lobby were enemies. Whereas using the philosophy of Michael Braungart, you can produce as much as you want. If Jules Clarysse would produce their C2C towels and double their production, invest in machinery and so on, *"it would be good for environment. You can produce as much as you want and everything is recyclable"* (all: Bauwens I: 00:05:41). By saying "*when we take back the towels, after one year usage, we do it also in order to be able to sell new C2C towels "* Bauwens expresses the replacement desire of planned obsolescence (Bauwens II: 00:17:22).

1.2 Social Perspective

1.2.1 Supply chain knowledge sharing: In the beginning of the C2C implementation, Bauwens reports, *"you have very little cooperation from other suppliers because they do not want to share their knowledge."* Jules Clarysse faced this obstacle as they had to understand

the composition of the dye that had to be biodegradable in order to conform to the C2C requirements. *"People just don't want to share their information with you"* (Bauwens I: 00:11:00).

1.2.2 Employee motivation: Stegemann experienced the employee to be highly motivated about the own sustainable products. For instance in sales, he reports, they want these products to be key area of their distribution activity. In manufacturing Stegemann personally did not observe such motivation. He assumes that it does not matter to a weaver whether she_he is producing a C2C towel or normal one. Anyhow, the company benefits from C2C when (like it happened to Jules Clarysse) a minister hands over such a certification in person. Of cause in such a moment the employee are proud that their company realized something alike (Stegemann: 00:14:40).

1.2.3 Long-term costumer relation: "*When we take back the towels after one year usage we do it also in order to be able to sell new C2C towels"* (Bauwens II: 00:17:22). Through the take back service Jules Clarysse's costumer receive a benefit, a service for free. Keeping the contact to the costumer favors the possibility that this costumer purchases as replacement the next Jules Clarysse product.

1.2.4 Shared values with consumer: *"Socially [C2C] is not a big movement yet"* (Bauwens I: 00:13:08).

1.3 Ecological Perspective

1.3.1 Research for supplier: A towel consists, besides the cotton fibers, basically of the care label, the sewing yarn and the dye. Stegemann emphasizes that during the C2C certification all these components have to be certified before the production of the new product could even start (Stegemann: 00:12:28). But for the supply these resources there exist only very few companies in Europe (Stegemann: 00:13:44). Bauwens complements the description of this obstacle. Jules Clarysse had struggels as they work with subcontracts for the dyes and these old suppliers were (like already mentioned in the social perspective) *"very unopen to share their information with us"* (Bauwens I: 00:19:30). Bearing Steelcase's long supply chain in mind, the described barriers for closed material cycles can be understood better.

1.3.2 Environmental legal compliance: A part of relevant content on this presumption has been been subsummed above (see "long term savings"). Babok states further "*some regulations are negligible or impulsing to us "* (Babok II: 00:19:28).

1.3.3 Effective ingredient choice: Steelcase doesn't compromise on the aesthetics. This is why, in some areas, Steelcase doesn't introduce a high percentage of recycled content. They "stuck" around 40% maximum because mostly all components of their products are visible and touchable for the costumer (Babok II: 00:07:57). One increase the recycled material in other products, like a car where one has structural elements that aren't visible (Babok II: 00:08:20). Furthermore Babok recommends that C2C should be complementary to LCA in order to rectify a company's weaknesses in materials use. Babok stresses the need to measure therefore the material input (Babok II: 00:27:09).

1.3.4 Closed nutrient cycle: Bauwens clarifies that the attribute "biodegradable" does not mean that one can through the towel in the garden after using it a couple of times. It is only biological compostable in industrial circumstances. Therefore Jules Clarysse cooperates with the company Van Gansewinkel. Babok states to this topic that the C2C end-of-life scenario, due to the certification, are not realistic enough as it doesn't take into account the complexity of the logistics of recycling (Babok II: 00:13:27). Still, Steelcase Europe aspires absolutely circular economy (Babok II: 00:13:55). But it is difficult to get into the closing loop system and one needs alliances. Babok illustrates the problematic with an example of selling a few hundred thousand chairs of "Amia". Those go to France, Germany, Spain, Switzerland, Slovakia, Nigeria and so on. Every point of sale has another number of items on stock. Nobody is willing to finance the needed logistics for such material recovery mission - that into the bargain would be sustainable. Besides the spreading of the technical nutrients worldwide, the re-sell price for that material is not high enough. Even if Steelcase would develop a global infrastructure with the help of transportation partners, Babok predicts, that they could not convince the manufactures to dismantle the products as it is not financially interesting for them. "*For industry like us this is not possible"* (Babok II: 00:19:54). *"It is going to take time to improve on this challenge to really close the loop"* (Babok II: 00:24:59).

1.4 Role of aesthetic design

1.4.1 Relation between C2C and other sustainable design approaches: Bauwens states that, to his option, C2C is the highest environmental standard with the cleanest and clearest philosophy for environmental production (Bauwens I: 00:13:08). While Steelcase Europe refused to fully concentrate on C2C communication as they as they already tackled environmental performance with another approach as early as 2002. *"That was not easy because we were in the position to use two."* For Europe they didn't want to let go the issues of environmental footprint, contribution to global warming and Life Cycle Assessment. Babok agrees on the critique on C2C for not taking into account these topics (Babok II:

00:12:30). Anyhow Steelcase is trying everything to design for C2C disassembly (Babok II: 00:24:04). In their communication they explain both:

Figure 23: The Think chair is 99% recyclable by weight. Disassembly takes just five minutes with ordinary tools (quoted from Steelcase 2004b: 4).

1.4.2 Form follows evolution: The idea of "evolution design" hasn't been mentioned in any statements.

1.4.3 Visible added value "aesthetic design and functionality": The importance of aesthetic design for sustainable design is depending on the product (Babok II: 00:06:36). Steelcase's clients are as interested as they can be to improve the environmental performance of the products. *"But they are not ready to compromise on the look"* (Babok II: 00:07:16). This is why Steelcase doesn't decrease e.g. the product's softness nor accept low quality from a visual standpoint on the lacks or paints (Babok II: 00:07:32). *"We need to guarantee the same level of aesthetics"* (Babok II: 00:07:49). Babok denies being the right expert for judging the role of aesthetic design for the company Steelcase. Anyhow, she assumes the visible design to be more consistent compared to couple of years ago when products were thought out in a isolated way (Babok II: 00:04:54). In her opinion, they made tremendous progress to create a consistent working method diametrically applied on different products (Babok II: 00:05:06). She describes the design style as influenced by the ambiance of design philosophy with pure lines and clean colors (Babok II: 00:05:17). A C2C towel, in contrast, underlies the quality criteria *"absorption"* and *"softness"*. "*There is no excuse for an organic or C2C product to be less qualitative just because it is organic or C2C."* From the point of view of quality, Bauwens rates his C2C towel not better than *"9 from 10"*. But he highlights the extra value that this towel is 100% biodegradable (Bauwens II: 00:07:02). A towel is not a product line in which *"aesthetic innovations"* can be created. The C2C towel looks "lucklily" just like every ordinary terrycloth towel: luxury white or colorized. *"This is also an advantage",* adds Bauwens reminding at the low quality appearance of organic coffee a long time ago (Bauwens II: 00:19:21).

Figure 24: The infinity towel by Jules Clarysse (quoted from c2ccertified 2012).

1.5 Role of service design

1.5.1 New business models/ Service design: *"Ideally we should close the cycle"* (Bauwens II: 00:14:49). At the moment Jules Clarysse is not able to close the cycle since they bring through the retailers like ALDI the product to the consumer, and then "we lose control" (Bauwens II: 00:14:55). If they would sell them to hotel chains they could ship e.g. 100.000 pieces at once for the use of one year. After this year the hotels could give them back (Bauwens II: 00:14:53). To development a business model about of this idea the cooperation with Van Gansewinkel is need. Jules Clarysse couldn't deal with the discarded towels so they need a third party to recycle the cotton (Bauwens II: 00:15:26). *"We use it as a service to the costumer that we take back the old goods."* (Bauwens II: 00:16:20). In the current stage Jules Clarysse *"keeps it simple"- "we are just some towel manufacturers with a good ideals"* who have with Van Gansevinkel a good partner (Bauwens II: 00:17:14). *"When we take back the towels after one year using we do it as a in order to be able to sell new C2C towels"*(Bauwens II: 00:17:22)(Therewith this service design is interrelated to planned obsolescence and long term costumer relation). Steelcase EU started a couple of years ago a pilot on eco-leasing. Technically they see it as an option to promote circular economy. Thus it was a struggle for Steelcase and its customers. *"For a reason that I still can't explain our customer base is not ready to o that"*. Babok explains that the first "service options" that they were proposing. weren't financially interesting enough to motive the customer. Steelcase wasn't able to *"catch the [financial] benefits"* of the material recovery experiment because the rental systems had been outsourced to an external company managed the "end-of-life" i.e. the recycling process. For the moment Steelcase decided not to found an own waste managing branch. Babok comments the pilots failure as *"kind of frustrating"*. In some key markets Steelcase EU has "take back programs" with local cooperations. Waste companies fill the gap to recollect the Steelcase products in order to evaluate how much of that furniture could be resold or donate, while the too old pieces have to be recycled. This is not fulfilling the aim, anyhow it creates transparency about the "end-of-life" concludes Babok (Babok II: 00:16:04).

Steelcase EU provides the costumer with their "transparency service" on two topics: First is the "end-of-life" and secondly the material chemistry labeling. Babok relativizes that transparency has become obligatory through regulations and Steelcase's clients are expecting this transparency and the avoidance of toxicity anyway (Babok II: 00:18:45).

2 Marketing - Mix in C2C practice

2.1 Broad C2C assortment: At present Jules Clarysse has only one product, the C2C towel which they have permanently in store i.e. "never out of stock" – ready to be introduce it at all to the market (Stegemann: 00:01:06). If there was a demand, Jules Clarysse would produce 100% C2C, assures Bauwens. But before they produce something, they try to sell it and they try to find costumers. Jules Clarysee produces what they can sell and at the moment - although they are very proud to have the biodegradable towel- it is a tiny little part of the market (Bauwens I: 00:01:52). Anyway Bauwens points out that all organic cotton towels together are in general less than 5% of the world market (Bauwens I: 00:02:27). The C2C towels make 1% of Jules Clarysses' production which means 1.000towels are produced every day. It is not so low for one single company, but low to the total market accentuates Bauwens. Babok estimates that 50% of Steelcase's round about 500 product lines are designed according to - or inspired by - C2C but not certified (Babok I: 00:00:47).

2.2 Placement mass market: Stegemann underlines that German commercial chains are generally willing to introduce sustainable product to the mass market as the retailers seek to improve their image in terms of sustainability performance (Stegemann: 00:04:17). The C2C towel is distributed at Belgium ALDI. According to Bauwens, Aldi is one of the most loyal and correct retailers. ALDI is discounter and has therefore a certain image but he describes the company as very fair. *"ALDI provides apart from C2C a fantastic quality"* and pushes product innovation. The requirements are very high at a very competitive price level, because they offer weekly promotions with weekly new products. *"What is positive about Aldi is that it brings volume on the market."* The only way for Jules Clarysse to produce 1% or more C2C is to find volume retailers (Bauwens I: 00:07:39). The towel has been already offered in ALDI week's special last year. As it was a success Jules Clarysse plans a next special in September 2012 (Bauwens I: 00:09:18). *"You know selling is really a challenge today."* So, Jules Clarysse uses at the moment every distribution channels whether discounter or big store neglecting the lost composting opportunity. But Bauwens underlines that *"idea behind C2C makes it logical to sell towels to hotels"* (Bauwens II: 00:08:27).

2.3 Premium price: *"The costumer is not ready to pay the premium"* (Babok I: 00:03:52). For the towel market Stegemann agrees on this statement but underlines that there was

nevertheless the existing willingness of the end user to buy sustainable products (Stegemann: 00:06:54). According to Bauwens, Jules Clarysse offers its consumer the towels for *"a honest price"* because ALDI is taking only very sharp margin on the product. Bauwens assumes that they would only reach a minimum turnover by other distribution channels like specialized retailers (Bauwens I: 00:09:43).. After two years investing in C2C implementation, they strategically keep the price difference as low as possible. Babok admits that Jules Clarysse learned in this regard from competitors who started with fair traded towels, priced them double as high as a normal towel and flopped. Bauwens expresses his agreement on Braungart's idea to *"make it a success and bring volume"*. "*If we can replace conventional towels by C2C towels, we would be very happy"* (Bauwens II: 00:05:22). Both companies' price strategy verifies the presumed inadequacy of the premium price strategy.

2.4 Communication of the added values "quality & health": Stegemann expresses his belief that an explicit explanation of C2C goes too far. He recommends communicating only biodegradability as the products' added value (Stegemann: 00:09:32). Until now that was the case because most of the consumer understand that message "biodegradable" rather than the C2C certification (Bauwens II: 00:00:58). Babok and Stegemann state independently from each other that communication was the way to turn C2C into a benefit (Babok I: 00:02:42 and Stegemann: 00:09:12). As differentiating tool within a market communication "sells the added values health and the environmental quality (Babok I: 00:02:42). Babok reports from a conference on "eco-innovation" where the suitable approach for environmental performance communication was highly discussed. She highlights that one has to differentiate between the B2B and the B2C (Babok II: 00:26:01).

2.5 Target group = B2C mass-market: Bauwens describes Jules Clarysse's target group as the segment that is already buying organic or fair trade products. He points out that this covered a growing segment of population. In contrast, Stegemann refuses to define a single target group as he stresses the broad costumer spectrum of Jules Clarysse's retailers. As they deliver to discounters, Stegemann describes the the target groups "to be from A to Z" (Stegemann: 00:07:13). The ongoing financial crisis in Europe drives the B2C clients to higher price sensitivity. Bauwens assumes further that consumers rather spent their potential "extra budget" for food than for non-foods (Bauwens II 00:02:57). Bauwens affirms this assumption by quoting that in France, the regular retail sales of towel decreased by minus 25% compared to last year (Bauwens II 00:04:56). In addition, Stegemann explain with the retailers' different levels of involvement in sustainability which lead to the obstacle that some retailer want to include sustainable product but deny to pay a higher price as the end user also refuses to pay more (Stegemann: 00:06:41).

2.6 Target group = B2B: Steelcase is targeting two big groups with their sustainable product lines. First are "global accounts" i.e. multinational companies that are present everywhere, that are sophisticated in their niche, understood the influence of space and want to develop consistency in their working atmosphere. They provide through space a consistent corporate image, use space to shape their work culture differently and as an attribute of employee preposition to attack talent. Such companies represent 25% of Steelcase target groups. Babok sum them up as looking for environmental product performance but are not willing to pay a premium price (Babok II: 00:09:04). The second target group is the public sector. This target group demands very strongly in France and the USA but less in the west of Europe or UK (Babok II: 00:010:55). As Jules Clarysse approached the hotel industry for their new business model of leasing towels, they made the experience that in B2B, reaching an agreement takes months or even years. *"The bigger the group the slower is the decision process."* Anyhow Bauwens is convinced that institutionalized business is the ideal market for this type of towel since the material cycle can be closed (Bauwens II: 00:07:42).

2.7 Educate target group about C2C: After explaining C2C in detail to its retailer, Belgium ALDI, Jules Clarysse is developing an initiative to communicate C2C to the B2C end user. They are considering a QR Code (Quick Response Code) on the packing that is meant to be scaned with a smartphone in order to provide more information about the background of C2C (Bauwens II: 00:01:30 and Stegemann: 00:09:01). Besides Bauwens mentions that Jules Clarysse seeks to encourage their consumer to convince other consumer (Bauwens II: 00:04:51). This approach conforms thereby with Ottmann approach to "educate and empower" while stimulating recommendations to friends and family.

2.8 Communicating concept of service product: Steelcase attempt failed and Jules Clarysse business model is in negotiation. So far, no implications can be drawn to evaluate the presumption.

2.9 C2C Certificate labeling function: Bauwens acknowledges that the C2C logo with the green and the blue cycle is very clean in its communication (Bauwens I: 00:13:30). But most consumers in Belgium do not know what C2C means (Bauwens II: 00:01:10). Bauwens does not criticize this fact. *"I can't do it better. It just takes time"* (Bauwens II: 00:11:46). Anyhow Stegemann stresses the opportunity for marketing to position the company with the C2C label. As the quality of the towel does not supreme normal towels the environmental benefits have to be highlighted. Further Stegemann reports of a discounter in the German market that retails for years successfully Jules Clarysse's organic and fair trade towels in special offers and hesitates to order the C2C towels as they are regarded to need of explanation (Stegemann:

00:08:04). In communicating C2C, Babok admits, Steelcase hasn't done a good job (as she is speaking for Europe) (Babok II: 00:11:42). In the USA her colleagues insisted on C2C. To understand this one has to acknowledge the fact that C2C was in that time the only privately initiated label that demonstrate environmental performance while the government in these days didn't push environmental innovation forward. Steelcase USA chose C2C as differentiator. In the other side of the world C2C became known later in Europe [due to the retarded translation of the C2C philosophy book]. Steelcase Europe refused to fully concentrate on C2C communication as they implemented before other environmental assessments and saw many obstacles (more in the C2C certification than in the philosophy behind) (Babok II: 00:11:51). *"So we had to play with the two what was not helping at all"* (Babok II: 00:13:50). Steelcase Europe was *"picking and choosing"* from different labels. Babok stresses the fact that Steelcase EU stand behind C2C, but not necessarily behind the certification. As mentioned they gained a C2C certificate for their "Amia" seating products, but thereby they nearly failed to receive an important label for the EU market, the "NF environnement", for lack of recycled content (Babok II: 00:14:27).

2.10 C2C high publicity: Bauwens affirms that C2C provide advantage of free publicity. As example he mentions an invitation for an event organized by the Belgium in July where the prime minister and the minister of environment are going to participate as well. Jules Clarysse is invited as leading factory in C2C for home textiles. So, Bauwens endorses that C2C results in free PR. *"This is what Jules Clarysse wants and needs"* (Bauwens II: 00:09:08). He went on to joke "*otherwise, if I wouldn't have C2C, I had no idea how I would get to the prime minister of Belgium - No idea - And now he writes to us."* (Bauwens II: 00:09:39). Regarding PR Stegemann names the opportunities to spread their C2C product on fairs, congresses and symposia (Stegemann: 00:11:26).

2.11 Role model for legislature: Bauwens recalls a position paper of the new Belgium government over round about 60 pages that contain the term "Cradle to Cradle" five times. (Bauwens II: 00:10:31). In addition to the invitation to the Prime Minister Bauwens confirms from his perspective that C2C provides a role model to the current Belgium government.

Statutory Declaration

Hereby I declare that this bachelor thesis has been written only by the undersigned, solely with the support the indicated references. Furthermore I assure that all quotations and statements that have been inferred literally or in a general manner from published or unpublished writings are marked as such. Beyond, I affirm that the work has not been used, neither completely nor in parts, to pass any previous examination.

Lüneburg, 31st of May 2012

Susanne Mira Heinz