

# ECO-EFFECTIVE FASHION THEORY

How to implement the Cradle to Cradle®  
concept into fashion and clothing design?

*The designer's professional, economic, social and environmental role.*

Heta Kupsala  
Master's Thesis  
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# ECO-EFFECTIVE FASHION THEORY

The How to implement the Cradle to Cradle®  
concept into fashion and clothing design?

*The designer's professional, economic, social and environmental role.*



Lapin yliopisto  
Taiteiden tiedekunta  
Vaate- ja muotusuunnittelun koulutusohjelma  
Syksy 2013  
Heta Kupsala

*The goal of the upcycle is a delightfully diverse, safe, healthy, and just world with clean air, water, soil and power - economically, equitably, ecologically, and elegantly enjoyed.*

*(McDonough & Braungart 2013, 12)*

*Even one person can do a lot.*

*(Mari Kooskora, Ph.D. Associate Professor at the Estonian Business School)*

## LAPIN YLIOPISTO, TAITEIDEN TIEDEKUNTA

**Työn nimi:** Teoria ekotehokkaaseen muotiin: Kuinka soveltaa Cradle to Cradle® konsepti muoti- ja vaate-suunnitteluun. Suunnittelijan ammatillinen, taloudellinen, sosiaalinen ja ympäristöllinen rooli.

**Tekijä:** Heta Kupsala

**Koulutusohjelma/oppiaine:** Vaatetus suunnittelun koulutusohjelma

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Tutkielmani on kolmen eri casen laadullinen tapaustutkimus kuinka soveltaa Cradle to Cradle® konsepti vaatetus suunnitteluun ja muotiin. Tutkimukseni pyrkii vastaamaan kahteen kysymykseen: 1. Kuinka soveltaa Cradle to Cradle® konsepti vaatesuunnitteluun ja muotiin? 2. Mikä on suunnittelijan ammatillinen, taloudellinen, sosiaalinen ja ympäristöllinen vastuu?

Tutkimusmenetelmänä käytän aineistolähtöistä sisällönanalyysiä. Aineisto koostuu suunnittelijoista ja asiantuntijoista eri yrityksistä, joilla on kokemusta Cradle to Cradle® konseptista. Käytän myös PUMA:n casessa apuna heidän lehdistötiedotettaan. Tutkimukseni teorian pohjaavat Fashion-ology (Kawamura 2005) muodin teoriaan sekä Cradle to Cradle® (McDonough & Braungart 2002) konseptiin. Muodin teorian kautta tarkastelen vaatetus suunnittelun paradigman muutoksia sosiologisina muutoksina.

Tutkimustuloksien perusteella konseptiin kuuluvat sitovat muutokset tuotteiden/vaatteiden tuotannon prosesseissa, joissa tutkitaan pienimmänkin ainesosan turvallisuus konseptin periaatteiden mukaan. Suunnittelun paradigman muutos vaate- ja muotiteollisuudessa edellyttää postmodernin luksuksen käsitteen ymmärtämistä: Cradle to Cradle® käsitteen yhdistämistä tavanomaisen luksuksen tuotteisiin, enemmän asiakkaiden toiveisiin pohjautuvaa massatuotantoa, suunnittelijan kokonaisvaltaisen roolin ymmärtämistä sekä tekstiilijätteen eliminoimista.

Tapausten perusteella voi todeta, että konseptin avulla suunnittelijat ja yritykset haluavat positiivisesti erottua kilpailijoistaan. Asiaryhmät, jotka nousivat esille sisällönanalyysissä liittyivät kierrätettäviin tuotteisiin (upcycle), tuotannon prosesseihin, materiaaleihin, tuotteiden takaisinpalautus systeemiin, suunnitteluun, markkinointiin sekä tulevaisuuden toiveisiin konseptiin liittyen.

Vastauksena hypoteesiin mielestäni Cradle to Cradle® lähestyy designia kokonaisvaltaisesti ja tähtää kestävän kehityksen yläpuolelle.

**Avainsanat:** fashionology -teoria, ekotehokkuus, suunnittelijan rooli, Cradle-to-Cradle® konsepti

### **Muita tietoja:**

Suostun tutkielman luovuttamiseen kirjastossa käytettäväksi X

Suostun tutkielman luovuttamiseen Lapin maakuntakirjastossa käytettäväksi X

(vain Lappia koskevat)

## UNIVERSITY OF LAPLAND, FACULTY OF ART AND DESIGN

*The name of the pro gradu thesis:* Ecoeffective fashionology : How to implement the Cradle to Cradle® concept into clothing and fashion design. The designer's professional, economic, social and environmental role.

*Writer:* Heta Kupsala

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My research is a qualitative multiple-case study on how to implement Cradle to Cradle® concept into fashion and clothing design and to see what is the designer's professional, economic, social and environmental role. I use the data-driven content analysis as an analysing method. My research data comes from the interviews among Cradle to Cradle® designers, specialists and companies. In addition I use some press releases from the PUMA company's InCycle collection 2013. The research endeavors to answer for two questions: 1. How to implement the Cradle to Cradle® concept into fashion and clothing design? 2. What is the fashion designer's professional, economic, social and environmental role?

The results imply that the concept requires committed changes in manufacturing and production processes of the product/garment where every tiniest substance is researched according to C2C® principles. The paradigm change in the fashion industry consist of the changes in postmodern understanding of what is the true luxury: Cradle to Cradle® combined to the traditional luxury items, using mass-customization, understanding the designer's creative role and producing no textile waste at all.

Through the cases I had the results that the companies and designers want to make a positive difference through C2C® design. The main topics in the content analysis were about the recyclable products, manufacturing processes, materials, take-back systems, upcycling, designing, marketing and future hopes of the concept.

As an answer to the hypothesis I think that Cradle to Cradle® gives a really holistic view on designing and looks and it as a concept beyond sustainability.

*Key words:* fashion-ology (fashion theory), eco-effectivity, designer's role, Cradle to Cradle® concept

*Further information:*

I give a permission the Master's thesis to be read in the Library X

I give a permission the Master's thesis to be read in the Provincial Library of Lapland X

(only those concerning Lapland)

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*PUMA SE, Mona Ohlendorf (Trigema Change®) & Fioen Van Balgooi (Refinity®)*

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# CHAPTER 1.

# INTRODUCTION

According to Cradle to Cradle® waste equals food. The aim is to choose positive ingredients in the first place to make the products totally qualified and recyclable. The basis for design is totally different. This is a starting chapter for my study. It introduces my topic, my research questions and methods, key terms and what has been previously studied about Cradle to Cradle® fashion. I chose this topic because I want to encourage designers to think more broad than they are used to and secondly I wanted to learn more about it myself.

## 1.1. Introduction and background of the thesis

I'm wearing a shirt which is made of recycled polyester. The fibers come from used soda bottles. Sounds like a good ecological garment. Or is it really? What does it contain? The authors of Cradle to Cradle® say that: "*PET (polyethylene terephthalate) is covered with synthetic dyes and chemicals and contains other questionable substances.*" (McDonough & Braungart 2002, 106). In addition it abrades during use, so that the particles might be inhaled or swallowed. In collaboration with one European chemical company McDonough and Braungart decided to design an upholstery fabric which would be safe for everyone. In other words it would not harm people who breathe it or the nature where it could be safely disposed. They did research on the ingredients which are commonly used in the textile industry and eliminated nearly eight thousand chemicals that were not safe. They found thirty-eight ingredients good to use in the fabric. The company started to produce the fabric and later told that the water coming out from the factory (*effluent*) has been proved to be cleaner than the water running in to the factory (*influent*). The workers started to use rooms that had been reserved to storage hazardous-chemicals and stopped wearing gloves and masks that had been given to protect from toxins in the workplace. The fabric was a success. (McDonough & Braungart 2002,106, 108-109) The upholstery fabric was named *Climatex® lifecycle*. It is 100% biodegradable.

The textiles include substances which were never suppose to be there. I was working a while as a salesperson in a big fabric store and I remember that I got these cuts on my hands. They hurt and I knew that it was because of the unhealthy substances. The fabrics contained chemicals and finishes that were not good. Unnecessary substances cause allergies and irritate the skin.

It is estimated that the Earth's population will rise to 8-14 billion this century. (United Nations 1987, 7) The truth is that we would need a lot more resources than we have right now to fill the needs of the next coming generations. The aim is big which sets the goal of long term decisions. United Nations said in their *Our common future* report (1987) that there's no need to pretend the change is

going to be easy or straightforward. (UN 1987) The core point of sustainability comes from the three legged milking stool of people, profit and planet. It's aim is to sustain the resources in different ways. Joan Farrer writes that sustainability is frequently misunderstood, and has become synonym for recycling and the environment when the original meaning was lying on social change. She points out that in the latest counts there are 70 different meanings to sustainability. (Farrer 2011, 20) As a word it has lost its original meaning because it is so widely used in multiple context that it confuses people. The first picture that comes to mind about sustainability is rarely growth and profitable business. It is more seen as opposite.

The World Wildlife Fund (*WWF*) published a report in 2007 that brought into daylight the luxury industry's seven common misconceptions concerning the environmental and social aspects. The aim of the report was to lead luxury brands to define again the concept of "luxury". (Black 2010, 131)

The first claim that *"luxury" is about personal pleasure so it can never be moral* is wrong since luxury deeply means truly the ultimate best one to have. Consumers no longer consider the products that cause environmental damage the highest class. These products no longer feel the best ones. The second saying is that *consumers of luxury markets do not care about environment or ethics* which is wrong because consumers do follow the international trends that include awareness, social and environmental responsibility. They do want to add meaning with their purchase. Third claim is that *brands cannot influence on values that consumers care about* which is wrong as well because brands all the time tell and say what are the things to care about right now. Brands do this by choosing certain kind of models, fashion values, showing how to take care of yourself and expose values in advertising. Fourth claim is that *materials, marketing and design only bring the value of the luxury brand which is said not be true because brands provide value to people and the environment through beneficial production, marketing and delivery*. The beneficial and responsible ways add the value for people. As the fifth claim is that *the heritage which luxury brands have maintains the value they have* which is not true because the brands which have a long history from the 19th or 20th century also need to evolve their heritage to values of 21th century. The sixth claim is that *only legislation will stop copying* which is not true because despite legislations the brands need to consider how much they emphasize their label and how much other deeper values to stop copying. Seventh point is that *luxury brands don't have much impact on society so they do not have to provide nothing more than charity and compliance* which is wrong because luxury brands have a multiple dimensional supply chains and impact on environment and communities globally. Stakeholders want systematic information about the social and environmental image. The non-luxury brands regard luxury brands as an example of corporate responsibility. (Black 2010,131)

Luxury is the very best quality. It is about awareness. It is the example to the others. The responsibility and action of luxury brands have an impact on every area of the supply chain and consumers. The use of cheap labor, use of non-renewable energy, industrial textile waste, pre-consumer and post-consumer waste, toxicity of the materials are just some of the present problems of fashion industry. I could go on with the list of the problems but I will concentrate on the solutions and ideas for new ways. The problems actually demand to think of other ways to design. They add pressure to think more open minded of the tradition of designing, the process, the materials from fiber to fabric, the people within, the consumers. What kind of models would bring long-term changes to fashion which itself is about change? What is the coming luxury?

*"Together, we take on the challenge of scientifically evaluating and innovatively designing products according to a unique design practice."*

*(MBDC LLC: Overview V 3.0., p.iii)*

Cradle to Cradle® focuses on improving health, social fairness and diversity of environment and human cultures without producing any waste. It focuses on upcycling instead of downcycling products presenting a circular approach to design. It was established by an American architect William McDonough and German chemist professor Michael Braungart (2002). My interest in the Cradle to Cradle® design concept started through my Bachelor thesis: "Vision to Clothing Design - Cradle to Cradle® clothes by the example of nature" (2010). I found the concept really interesting and something I had not heard before. In 2010 the concept had already been working actively with big industries and has continued in that direction. Today it has become more known and has increasingly spread around the world into industries concerning different areas.

In the fashion/apparel industry clothes are either intentionally or unintentionally made to last short time so that the cycle could run. When it comes to the rising rates of consumption and apparels becoming waste almost immediately, companies and industries have started to think various answers to this problem. I read from one research that a lady bought forty t-shirts for 2 pounds each for her holiday trip and discarded them one by one after always using each once. She wanted to have something fresh and clean every day. When she travelled back she could buy again something to fill her luggage. (Sherburne 2009, 14) Should we make t-shirts that are like peels from an apple which you can just throw away?

Fashion designer Stella McCartney aims to work ethically, aesthetically and in sustainable ways. She said that her work is to create luxury items. She loves people coming to her store without noticing that something is faux leather or organic. She thinks that the biggest challenge is that people won't notice and points out that she's a fashion designer not environmentalist. (Black 2010, 32) They aim for the highest quality without people noticing the eco-effectiveness of the product, which gives the design an even better goal.

The aim of this research is to look at the possibilities of Cradle to Cradle® and study this circular life-cycle approach in fashion and clothing design. What it actually means and how is it used in practice? Fashion exposes status, identity, success, health, beauty and something really desired. The concept is dealing deeply with the chemical content of materials and closed loop cycles in nature. What would a eco-effective "luxury" fashion look like which would not compromise on quality and would not produce any waste? I think the new luxury and Cradle to Cradle® have something in common - to aim for the very best.

## 1.2. Research questions and hypothesis

*My research questions are:*

- How to implement Cradle to Cradle® concept into fashion design? What is the fashion designer's professional, economic, social and environmental role?

*Subcategories/questions:*

- Which are the reasons why the concept is good? and not good?
- What practical changes does it include? (*design, production etc.*)
- Which are the biggest challenges?
- What do the certifications include?
- How are the products recyclable?

*The hypothesis:*

- Cradle to Cradle® is beyond sustainability. (Pfau 2012, EPEA)

In the focus is also the role of the designer. I asked from Jenny Pfau from the Environmental Protection Encouragement Agency (*EPEA*), the other company behind Cradle to Cradle®, what is the designer's most important role in sustainable design. She answered that:

*"I cannot say what is the most important role of a designer in the sustainable design is because Cradle to Cradle® is beyond sustainability."*

*(Pfau 2012)*

Mostly the literature dealing sustainable fashion usually categorises the concept as a part of sustainability. It is seen as zero-waste practice, circular life-cycle thinking or as an eco-design strategy. The point that it is beyond sustainability comes from the fundamental difference between Cradle to Cradle® (*eco-effectivity*) and sustainability (*eco-efficiency*). The main difference between eco-efficiency and eco-effectivity is that eco-efficiency aims to reduce and minimize the negative footprint (reduce pollution and waste) and Cradle to Cradle®'s target is to increase the positive footprint (*eliminate pollutants and waste*).

Eco-efficiency means in short, doing more with less. It is considered to be a strategy of change across the globe within industries. Eco-efficiency is a sustainable way and also mentioned for example in Our Common Future report (United Nations, 1987). It says that industries should reduce the pollution and waste and be more efficient. The Business Council for Sustainable Development announced it to be vital for companies who aim to be successful, competitive and sustainable. Eco-efficiency relies on three R's of Reduce, Reuse and Recycle. (McDonough & Braungart 2002, 51-53)

McDonough and Braungart answer to this that reduction does not take the destruction away, it only slows the process down. They say that people do not have enough knowledge about the dangerous emissions of what kind of effects they have on natural systems that you could think the slower process to be healthy on long-term. (McDonough & Braungart 2002, 55)

Fioen van Balgooi says that the 3P's; People, Profit, Planet, line of thinking is how can I work for people and planet without losing any profit. Furthermore, the 3E's; Equality, Ecology, Economy of Cradle to Cradle® contains some of the same values of sustainability but the question is different. It is how to make economic profit and at the same time positively contribute to equality and ecology. Ecology and equality are the core values of a company and you gain profit. (van Balgooi 2009, 13) 3P's there comes a point where loss is experienced while in the 3E's the point is to experience abundance from what you are doing.

## 1.3. The structure of research

*The first chapter* is the introduction to the thesis. It brings out the problems of material toxicity, cheap labour, fast cycles of fashion, complexity of sustainable fashion and misconceptions about luxury brands. It introduces the concept I study. It includes my research questions, the methods and data which I use, related key terms and how this area has been studied before in academic research. I chose this topic because I want to encourage designers to think more broad than they are used to and secondly I wanted to learn more about it myself.

*The second chapter* explains case study as a research strategy and content analysis as my analysing method. It introduces my informants, the companies related to them and why I chose to interview them. They are from a variety of backgrounds which gives a more holistic picture as to what the Cradle to Cradle® framework can be in practice.

*In the third chapter* I take a closer look to the fashion research and theories. This chapter explores the fashion theory of fashion-ology created by Yuniya Kawamura and how I have used it in my work. I consider it important to bring the eco-effective design thinking more closely to the theories of fashion because it helps to see the immaterial change that is happening in the mindsets. I gather the areas of what I view important in a design paradigm shift to more eco-effective fashion design in this postmodern time we live in.

*In the fourth chapter* I look at the Cradle to Cradle® framework from the basis of my interview with Jenny Pfau and written literature about the concept. In the interview we talk about the EPEA GmbH, the Cradle to Cradle® framework and its use in textiles and fashion. I tell the requirements of Cradle to Cradle® certification and overall hope to give a deeper and clear picture about the concept through this chapter.

*The fifth part* explains the process how I have used content analysis in my study. I use the data-driven content analysis and explain how I created the categories from the data. The interviews and some press releases from PUMA SE sportlifestyle company work as my data. I have the theoretical frame about the information and I explain how I understand it.

*In the sixth chapter* I tell about the results that I found to my research questions. I analyse the results and think of guidelines as an answer for eco-effective fashion theory.

In the conclusion, *in the seventh chapter*, I go through once again what was my purpose in my work and what kind of answers I found. I think about the validity of my research through the trustworthiness, research ethics and novelty value of it. I also consider how this study could be generalized and studied further.

## 1.4. Survey methods and collected data

As the research goes from data to theories and theories to data it is abductive. There is a classification to data-driven, theory-driven and theory-based analysis. Tuomi and Sarajärvi explain about theory-based analysis that the knowledge is there but it is only there to open new ways to think not to be tested. My study goes between the data-driven and theory-driven analysis but I consider it more data-driven. (Tuomi&Sarajärvi, 2009, 96-97) Yuniya Kawamura explains about the objectivity in research. She says that social science should remain in a neutral position. Researchers are expected to look at the world as an external phenomena and be as value-free as possible. (Kawamura 2011, 32-33) My aim is to add understanding and knowledge to the phenomenon of eco-effective fashion design and bring new ways of thinking in an objective way.

As the research strategy I use case study strategy. The case studies are usually picked from a specific research group, in my case, among Cradle to Cradle® designers and specialists and companies. I interview four different persons: Geoecologist Building Biologist IBN Jenny Pfau from EPEA Hamburg, Clothing designer and managing director/creative director of Trigema Change® Mona Ohlendorf, researcher and consultant of Cradle to Cradle® and the eco effective fashion Fioen van Balgooi from Refinity® and PUMA SE sportswear company's Safe department team head Stefan D. Seidel. For data analyzing I use data-driven content analysis and categorizing.

Kawamura says that one method is never sufficient to provide enough information on a subject one is studying. Triangulation means multiple data gathering techniques focused on the same phenomenon. (Kawamura 2011, 110-111) I use bibliographic resources like books and articles, some press releases from PUMA InCycle 2013 collection and the interviews. As the interview type I use semi-structured interviews. Kawamura explains that semi-structured interviews consists of little structured questions, flexible wordings where questions can be clarified or further added or deleted. (Kawamura 2001, 73)

## 1.5. Key terms

*Cradle to Cradle® (C2C)* design concept means designing without producing any waste. Materials run in either a biological or a technical nutrient cycle. The aim is to improve the quality of products so that they give better quality for the consumer, include no risks for the health and have both economic and ecological benefits. It is opposite to the current cradle-to-grave way of design. Cradle to Cradle® design aims not to reduce the linear material flows and production but make nutrients to live in circular cycles, where value once created, remains the same. It lays on three fundamental principles that waste equals food, celebrate diversity and use renewable energy. (the EPEA GmbH 2013)

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*Cradle to Cradle® and C2C®* are trademarks of MBDC. Certified Cradle to CertifiedCM (in the level of *basic, bronze, silver, gold or platinum*) are certification marks licensed by the Cradle to Cradle Products Innovation Institute. (MBDC LLC: “Overview – C2C Certified Product Standard V 3.0)

There are two companies working behind the Cradle to Cradle® concept: EPEA (*the Environmental Protection Encouragement Agency*) owned by Michael Braungart and MBDC (*McDonough Braungart Design Chemistry*) owned by Bill McDonough and Michael. In other words EPEA is divided to MBDC which is owned by both, by William and Michael. EPEA is owned only by Michael. (Pfau 2012)

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*Eco-effectivity* means working on right things on the right products and services instead of making the wrong things less bad (eco-efficiency). In other words doing eco-efficiency with right things in a right way. The vision is to think about the purpose of a product and consider the whole impact of it. (McDonough & Braungart 2002, 76,82)

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*Fashion/clothing* are the terms which I use in this research. With fashion I mean the beliefs and thoughts of the immaterial concept of it. It is usually something exclusive, luxurious, desired and socially accepted. With clothing I mean the garments, the dress itself.

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*Fashion-ology* is a term which fashion researcher Yuniya Kawamura (2005) created to describe the immaterial substance of fashion. It's not necessarily related to clothing at all. Fashionology is concerned with the process of beliefs that people have in their minds. A product must go through this process in order for it to become fashion.

## 1.6. Earlier research of the topic

Sustainable fashion has become an increasingly famous subject in academic research but research in Cradle to Cradle® fashion is hard to find. There are cases that can mention it as a part of their research but studies completely focusing in this area are rare.

In the University of Lapland there are cases dealing with sustainable clothing and textile waste management in Finland. *Laura Seppänen* wrote her thesis about “Sustainable responsible outdoor clothing: What every designer should know” (2010). Her aim in the thesis was to study what a designer should know about environmentally friendly design to make sustainable apparels. Her work is focused on researching these topics especially in the outdoor clothing industry and functional outdoor clothing. *Jenni Räsänen* in her thesis with “The disappearing of textile waste. Planning the use of post-consumer waste – possibilities in Finnish textile and clothing industry” (2011). With the problem of post-consumer textile waste and how the textile waste could be utilized by the industry.

From Aalto University I found one work from textile designer *Heini Ruuskanen* dealing with the Cradle to Cradle® concept. She designed and manufactured her Master’s level jacquard fabric collection “Reflections” in Backhausen Interior Textiles in Austria, which is one company using Cradle to Cradle® principles. The company has developed a technique to recycle the used fabrics in their factory in a safe way. Her thesis “Reflections” (2011) deals with issues about sustainable textiles, life-cycle thinking and Cradle to Cradle® design.

*Esther Bättschmann* graduated from ESMOD in Berlin from the Department of Sustainable Fashion. She designed her Master’s collection “Startklar” with co-operation with EPEA Switzerland, Weberei Appenzell, Gessner AG and Backhausen Interior Textile company. Her 2013 Autumn ready-to-wear collection provide clear, powerful and authentic; minimalistic and fashionable garments for men and women. Bättschmann says that she sees the concept as a radically different approach to design and production of intelligent, toxin free products. (EPEA, Switzerland)

*Fioen van Balgooi* is the owner of the research and advice service Refinity® and is a researcher of eco-effective fashion design. Her essay and research “Eco-effective fashion design. A new mindset” (2009) deals with fashion designer’s mindshift into a more eco-effective way to design. She co-operated with four different designers who were invited to this study to design and think

at the same time about the consequences of their choices on material, technique, colour, form, service and the use of the product. She wanted to research what effects these choices have on ecological, economic and social environment. (van Balgooi 2009, 9)

American researchers in cooperation from different Universities have done two studies which were related to C2C and apparel design. The US Environmental Protection Agency provided a research to create a cradle-to-cradle model for sustainable apparel design and production based on an existing design models. *Hae Jin Gam from Illinois State University, Huantian Cao from University of Delaware, Cheryl Farr and Lauren Heine both from Oklahoma State University* wrote together the research work “C2CAD: a sustainable apparel design and production model”. They tested the C2CAD model (*Cradle to Cradle Apparel Design*) in knitwear design and production using organic cotton and environmentally friendly dyes. (Gam et al. 2009)

*Hae Jin Gam, Huantian Cao, Jaclyn Bennett, Caroline Helmkamp and Cheryl Farr wrote a research paper “Application of design for disassembly in men’s jacket: A study on sustainable apparel design” (2011)* The purpose was to create a design model to be used in construction and disassembly of men’s jacket in order to make it easy for manufacturers and consumers to discard (*biological cycles*) or reuse (*in technical cycles*). The design focused on selecting the materials, sewing similar materials together and researching which stitches to use. They measured the time how long it took to disassemble the jacket. They designed a jacket that could be disassembled into biodegradable outer layer and recyclable (*technical nutrient*) lining in 1,5 minutes. The findings could be used in apparel industry in order to prevent the pollution and preserve the existing materials. (Gam et al. 2011)

*“We feel that we are responsible for the environmental impact our products cause and this innovative concept in sustainability is a first step towards our long-term vision of using innovative materials and design concepts for PUMA products that can be recycled in technical processes or composted in biological cycles.”*

*Franz Koch, CEO, PUMA SE*

## CHAPTER 2.

# RESEARCH METHODS AND DATA

In this chapter I shortly explain the case study strategy and the content analysis method. I introduce the people I have been contact with from different companies. They are from a variety of backgrounds which gives a more holistic picture as to what the Cradle to Cradle® framework can be in practice.

## 2.1. The case study as research strategy

In social sciences there is a general way to design a case study research. According to Yin a case study research plan should consist of five components; the study questions, its propositions, units of analysis, logic how to link data to the propositions and criterias as to how to interpret the findings. (Yin 2003, 21)

My research question is posed in “why” and “how” form so it is natural to use a case study strategy. My study is a descriptive case study. I have many cases which means my study is a multiple-case study. The different cases give present professional information and explain the phenomenon. Yin’s case study is a real life context study about the phenomenon especially when the line between a phenomenon and the context are not clear enough. (Yin 2003, 22) My research question is how *(and also to consider the why)* to implement the Cradle to Cradle® concept into fashion and clothing design? My cases come from a variety of enterprises from the clothing design field: M.Ohlendorf for Trigema Change®, van Balgooi from Refinity® and PUMA SE sportswear company’s Safe department’s team head Stefan D. Seidel.

So besides the research question there also comes the opportunity to think about the study propositions, which simply means the reasons why do I do a descriptive case study about this phenomenon. The research questions alone do not tell actually what I have to study. (Yin, 2003, 22) I think about the reasons for my research as to why this topic is important. The products that are good, should be based on certified qualities, be made of better quality, consist of the design process considering all aspects (the triple top line of how does the product work economically, socially and environmentally) and be made of materials that are safe and totally recyclable. According to the authors of the C2C®, the products should be diverse, safe, healthy and made in a just way providing a world with clean air, water, soil and power.

(McDonough & Braungart 2013)

Units for analysis consists of the fundamental components of what the “case” is. Yin says it can easily become a problem to define what the “case” actually is and mislead the researcher out of the set. Usually a classic case study is an individual, a relevant individual for the study. If you have many individuals it means multiple-case study. “Case” can also be an event or an entity. It can be harder to define than individual cases. It can be a program, an implementation or organizational issue. (Yin 2003, 22-23)

I have three cases; Mona as designer and former creative leader of Trigema Change®, Fioen from her own consultancy company Refinity® and deputy head Stefan Seidel from the safe ecology department from the sportlifestyle company PUMA SE. My main units are the Cradle to Cradle® concept and fashion/clothing design. The context is to understand shortly what the concept includes and how the development of a Cradle to Cradle® product goes. The embedded units are products, materials, design and recycling in biological and technical metabolisms. The components help to see what my study is about and how the structure is formed. Several pieces or categories from the same case study are illustrated in the analyzing section.

### *The theory*

The theory in descriptive qualitative research should consist of the purpose, the full range of topics that should be considered as a complete picture about what is to be studied and the topics which are seen as evidence. Theories are divided to individual, group, organizational and social theories. (Yin 2003) My theory comes under the social category. Fashionology as a theory comes from combining fashion and sociology together (Kawamura 2005) I base the theory of Cradle to Cradle® on the interview with Jenny Pfau from EPEA Hamburg, webpages and literature related to the C2C® subject.

According to Eskola & Suoranta a theory is like a group of thoughts behind the research. They say that instead of thinking it as evident of something, a researcher could think it as a possibility. The evidence should be used as a starting point that can always be referred back to if needed. (Eskola & Suoranta 1998, 80-81)

## 2.2. Content analysis as research method

A simple way to explain content analysis is in four steps. According to researcher Timo Laine the first step is to make a decision as to what is the most interesting thing in the material and everything else is then put aside. He suggests to go through the material and mark the things that are included in the "most important" decision category. Then the marked things are collected together and put into themes. Finally a conclusion is written. (Tuomi & Sarajärvi 2009, 91-92) I will use Laine's frame in my analyzing, I start with the most interesting thing to find from the data. I put everything else aside and build different categories, analyze and explain how I understand them.

Inductive means forming a theory from one case. Deductive approach means forming a theory from general knowledge for one unit or one case. The abductive approach means that a theory can be constructed when there is some kind of idea behind it. (Tuomi & Sarajärvi 2009, 95) Even though I collect theoretical background from the themes and fashion theories I start analyzing without thinking the theories at all. Instead of saying that my approach is deductive or inductive I would say it's more abductive.

In content analysis it isn't enough to just categorize documents, which can be interviews, books, articles, discussions, reports or any written documents, into a summary but to make conclusions of the reorganized data. The point is to search meanings in data-analysis behind the written text. (Tuomi & Sarajärvi 2009, 103) I hope to find some new stories, notions and information that has not been earlier seen, something that is newly discovered in this research.

Schreier explains about finding the meanings through qualitative content analysis. Basically it is done by categorizing the material according to coding frames. Qualitative content analysis is systematic and can be used to collected materials such as interviews and other sampled sources like internet articles. The analysis is about understanding the everyday life context and the meanings which go beyond what is seen. (Schreier 2013, 1-4)

My task is to translate the meanings behind the information. I will translate the meanings that are interesting and place them into a coding frame or frame of categories. The practical work is really systematic and clear. What is important overall is to choose the most necessary information according to the main and sub-questions. The main thing is to see the things that go beyond the everyday life context.

*Main questions:*

- How C2C® concept is implemented into fashion/apparel design?
  - How does the product work economically, socially and environmentally? (*triple top line*)
- 

*Subcategories/questions:*

- Which are the reasons why the concept good? and not good?
- What practical changes does it include?
- Which are the biggest challenges?
- What does the certification includes?
- How the products are recyclable?

## 2.3. Multiple-case study data

Triangulation means that you gather data on the same phenomenon from multiple sources. I used as collected data the interviews as well as other data such as books, articles and web page contents related to the phenomenon such as press releases for example from the PUMA InCycle 2013 collection. I use different kind of data to get as clear and qualified picture about the phenomenon as possible. The interview with Jenny was via skype and the other interviews were email conversations. I did not have a chance to do face-to-face interviews because the people were mainly from different countries.

Tuomi and Sarajärvi say that in qualitative research it is important that the informants know a lot about the issue and have experience with it. They add that you should discuss and take into account how many informants you will include. It is about the qualification of the informants though the amount can totally be overlooked. (Tuomi & Sarajärvi 2009, 85)

Since it's about understanding a phenomenon I think that it is not that important how many interviews I'll have but more about how specialized and professional they are. Although as Tuomi and Sarajärvi say, the amount is still important. My aim has been to contact a few good Cradle to Cradle® specialized designers and professionals which I thought to be relevant for my study. I noticed that there were not so many of them. After searching I found few and I am grateful for the help, information, advice and effort they gave me for this work.

Tuomi and Sarajärvi emphasize that the process of choosing the informants needs to be clarified and explained. The researcher itself decides the criteria and considerations used as to why an individual is the right person for his/her study. (Tuomi & Sarajärvi 2009, 86)

Behind the Cradle to Cradle concept there are two companies: EPEA International Umweltforschung GmbH in Germany and MBDC LLC Michael Braungart Design Chemistry in Charlottesville Virginia in US. MBDC licensed Cradle to Cradle Products Innovation Institute 2012 to be in charge of the Cradle to Cradle CertifiedCM Product Standard system. It is essential that companies and designers cooperate with EPEA and MBDC in order to make the products in the right way. My criteria was to choose informants/companies from the basis that they have been dealing with these companies and that they have combined the Cradle to Cradle® and fashion design together. I first took contact to the Cradle to Cradle Products Innovation Institute related to my subject and they directed me to EPEA

where I got a contact from Jenny Pfau. She pointed me Mona Ohlendorf and the webpage of Fioen van Balgooi and her consultancy. Mona pointed me Matilda Wendelboe and the company PUMA. Finding the right informants was a process. Like Mona said about the complexity:

*”You will find some designers and students on the internet that mean to work according to C2C® - as well as you will find lots of products. I know from EPEA, that there is nearly none of them really doing C2C® . Half of them simply do not understand what C2C® is about and for the other half it is just not possible to really work like that, because the options and suppliers are so small and few. It is a real hassle:) I know it.”*

*(Ohlendorf 2012)*

The number of the informants in this study is limited because the people working according to C2C® are few, like Mona say. I have not yet found any companies from Finland who would have been using the concept in a larger scale in textile and fashion industry besides the textile company Finlayson. I wanted to focus on clothes so that is why I mainly tried to find clothing designers or companies for my case-studies. Through Jenny Pfau I got really good information about literature, blogs and web pages related to my subject. From the interview with Jenny I got interesting information about EPEA and Cradle to Cradle® design which I explain more in chapter four.

Pfau herself has worked for EPEA Hamburg team for over eight years. She has been working in the company in different kind of levels and positions. She is a Geocologist and Building Biologist IBN as a profession. She explains that EPEA is working in different fields, not just for example in architecture or textiles. There is always a possibility to look at different projects and topics. Jenny informs that in the Hamburg team there are around thirty five to fifty people working. They are mostly scientists and designers. The scientists are for example social, natural or environmental scientists. The team is international and the people in addition to Germany come from all over the world. (Pfau 2012)

## 2.3.1. The cases of my research:

*PUMA SE, Mona Ohlendorf (Trigema Change®) & Fioen van Balgooi (Refinity®)*

*Mona Ohlendorf, Germany.* Ohlendorf was a managing director and creative director of collection Trigema Change® for Trigema®. Trigema is a big textile and clothing company in Germany which has still almost the whole production chain in Germany. It employs 1200 employees. In 2004 Michael Braungart proposed for the company to start to develop Cradle to Cradle® optimized garments. Trigema®'s local production was a privilege since every substance, process and product had to be tested by professionals right away. Local production enables to work quicker and control every step in the process. (Ohlendorf, 2012) In 2006 the first cradle to cradle garment hit the market as “compostable t-shirts” and later as “Wellness Shirts”. In 2010 Ohlendorf met Trigema® in order to start designing a new fresh line called Trigema Change®. The collection was more attractive for present styles but as well as safe and environmentally friendly. It still follows the honest and traditional attitude of Trigema®. (Ohlendorf 2012)

▼ *Figure 1.* Trigema Change® collection by Trigema®.



Fashion designer Mona graduated in 2007. She studied both in Berlin and Amsterdam. Her diploma was dealing with social and environmental problems in the textiles industry. Since graduation she has been working as a self-employed fashion and costume designer in different projects for example Mosch Berlin fair fashion project. In 2009 she was one of the Berlin based group of fashion professionals who founded eco-fashion agency "Common Works" which helps labels to construct environmental and socially conscious fashion production. Since the Spring 2010 she has been directing the creation of Cradle to Cradle certified line Trigema Change® until the 1st of April 2012 she was not responsible for Trigema Change® anymore. (Ohlendorf, 2012 & Ohlendorf 2013, websites)

The collection was made according to the ecological Cradle to Cradle® standards. They were made of 100% biodegradable material developed by Trigema®. When the garments are disposed the materials can easily return into biological cycle as a nutrient of nature. Through the collection Trigema® company took steps to prove the progress towards a future-optimized process in making products. (Mona Ohlendorf 2012 websites)

Mona is one designer who has a lot of information about the Cradle to Cradle® way to do fashion because she was there to do the very first testing's with Trigema Change® collection at Trigema®. She has seen the whole process and knows what the true difference between traditional design and C2C®. From her interview it became very clear that the fashion designers in this area are few and if there would be, she definitely thinks they should cooperate with each other as allies, not as competitors. At the moment she is not involved in Trigema Change® but was really willing to share her knowledge.

### *Fioen van Balgooi/ Refinity®*

Fioen van Balgooi is the owner of a research and advice company Refinity®. The main aim of the company is to look for eco-effective ways to design. She helps designers to think eco-effectively and design that way. The company is located in Zeist, the Netherlands. Fioen van Balgooi cooperates with designers, companies, suppliers, fabric developers and suppliers of sewing accessories and different techniques. Refinity® wants to stand for eternal improvements to contribute a change in the fashion world where people would make conscious choices that respect the environment and people. According to Refinity® the word eco comes from the latin word "oeco" and Greek word "oikos" meaning the household. So the household is all around us. (Refinity 2013)

Fioen has done projects with different designers. In the Fragmented Textiles (2009) collection for example she created together with Berber Soepboer garments that are made of Cradle to Cradle® certified wool felt with bright colors. The click and fold technique enables the use of the garments in multiple ways. The pieces are not stitched together at all. (Refinity 2013)

Refinity® sums up the difference of eco-efficiency and eco-effectivity. The important strategy of sustainability aims to be environmentally friendly with efficiently working more with less. In sustainability recycling leads to downcycling. The clothes become useless when they do not live anymore to their purpose. Eco-effectiveness is about more circular thinking. It is something that C2C® wants to achieve. The old materials becoming a new product means that the previous products do not contain any harmful materials. The materials run in biological and technical cycle and they are kept as separates. Refinity® mentions also Ökotex, GOTS and Blue design as well as other organisations as making textiles without harmful chemicals. Refinity is first hand a consultancy agency which is collaborating with designers and looking at how things can be done eco-effectively. It means choosing the materials, colours and how a product can be designed so that it is easy to separate. (Refinity 2013)

Fioen is an official consultant of Cradle to Cradle® optimized fashion. She followed the training of EPEA and is an accredited C2C® design consultant. She uses the term eco-effective to describe the design paradigm and combines Cradle to Cradle® also to other assessments that she has found useful e.g. Ökotex, Bluedesign and GOTS. To make the change easier she wants to help designers towards a more eco-effective design. Fioen runs a consultancy to give them information from the suppliers, the materials and techniques. She told me about Biomimicry (Benyus 2002) which was announced at the same time as the Cradle to Cradle® concept. There are some similarities between these two, at least the idea to design by the example of nature's systems. There would be really interesting points in biomimicry as well as. However, biomimicry will not be included much in this research because I consider it as an own area to look at and I want to keep my work's aim and frame specific.



*Figure 2.*

Fragmented Textiles collection, 2009.

A collaboration between Refinity and Berber Soepboer.

Photographer: Savale,

Model: Marjolein Heij,

Make-Up / Hair: Annelies van Oosterum.



## *PUMA SE*

### *Recyclable and biodegradable collection InCycle 2013*

*Interview Mr. Stefan D. Seidel from PUMA SE Safe & Ecology Department.*

PUMA launched the brand new collection InCycle which is 100% recyclable and Cradle to Cradle basic CertifiedCM in Spring 2013. The new collection includes sneakers that biodegrade in few months, a traditional PUMA jackets, shirts and backpacks. The company is multinational sportswear brand which was founded in 1948. The aim of the brand is to be the most desirable and sustainable sports lifestyle company in the world. Franz Koch, the former CEO of the company, has said that they drive to look at things through different lens and want to break the convention using innovation and creativity. (PUMA 2013)

The different parts of the company's sustainability and business are safety and humanity, vision, peace, creativity, and the brand and its management. The Management Board of PUMA SE takes the responsibility to announce information about their company according to the Global Reporting Initiative (*GRI*) where is a description to Sustainability Reporting Guidelines Vol.3. The criteria includes materiality, stakeholders, sustainability context, timeliness, comparability and reliability and accuracy. (PUMA 2013, PUMA Business and Sustainability report 2012, 85) PUMA is a partner in the commitment of Zero Waste Discharge of Hazardous Chemicals with Adidas Group. C&A, Li Ning, Nike by the year 2020. (PUMA 2013)

PUMA takes remarkable responsibility on their visions related to sustainability. The vision is to be fair, honest, positive and creative. On their report they have their newest version of their scorecard. It was announced first in 2009 and 2010 was a baseline year for that. It consists of the main targets. One of the aims is reduce 25% of water, waste and CO2 emission amounts by 2005. They want to reduce their waste through biodegradable and recyclable products. The target is that 50 percent of their products would meet the company's sustainability index and 90 percent of their products would be delivered from the factories which resulted very good or good in the social and labour standards. (PUMA Business and Sustainability report 2012, 13)

The vision in safe department is that they improve social and environmental conditions in their supplier factories and in company's own operations. They minimize their own and consumers footprints by producing innovative sustainable products. They enhance creativity and think that it is a way to bring change things to be better. The company promotes peace for example donating sports equipment because they believe sports bring bring people together and takes negative hostility away.

DEVENIR INVISIBLE PAR NATURE.



*Figure 3.*

Barthes Yves, 2013.

“Devenir invisible par nature - become invisible in nature.”

PUMA InCycle collection recyclable and biodegradable.

**PUMA**  **Incycle**<sup>™</sup>

Collection recyclable et biodégradable

The challenges for the company are right now to make the supplier factories even better places to work in, develop more sustainable products and engage customers to know their visions. (PUMA Business and Sustainability report 2012, 13)

Stefan D. Seidel said in the interview that they have done many initiatives to reduce the PUMA's footprint and to become at the same time the most desirable sports lifestyle company. The InCycle collection 2013 is the first initiative to reduce the waste which the product causes at the end of its lifecycle. Koch, the former CEO, sees the collection as a first step towards long-term goals through innovative sustainable concept which Cradle to Cradle® presents. In its design they have used innovative materials in the design. The products can be recycled back in through technical process or be composted as a biological nutrient. (Seidel 2013)

The global sports brands besides PUMA have made big steps in environmental and social aspects. PUMA is a multinational brand and that way a good example for larger companies to turn their way to circular design thinking. They have innovatively taken steps to create the right materials and zippers to be fully recycled and evaluated a take-back system for customers to return the clothes back to reprocess when they reach the end of their lifecycle.

Why exactly sports brands like PUMA have done the material innovations and taken more visible sustainable steps? I think this is an interesting question why the same improvements are not seen as widely and seriously for example among luxury brands and other lifestyle brands. Perhaps it is because the other brands want to keep silent about these issues or they have not yet taken the steps for changes that much. The reason might be also that the supplier factories of sports brands make more new material innovations and have possibility for that. The pressure might come as well from the hard competition in sports lifestyle area especially when it comes to designing new kind of materials. Perhaps also the sports customers are demanding and have awareness for good material qualities so the brands have to make new innovations all the time.

An interesting area of innovation is the sportlifestyle fabrics and lightweight fabrics. The PUMA Track Jacket in InCycle collection is made of 98% recycled polyester. The material is derived from used PET bottles and the jacket's zipper is made of recycled polyester as well. (PUMA News 2012)

Fletcher writes about the lightweight materials that they need fewer kilograms to make more clothes. Lightweight materials, e.g polyester or nylon, are efficient to transport, they launder well and can be washed in low temperatures. Synthetic fibers can be produced by the example of nature but are not made of natural fibers. In the general debate it is talked that are natural fibers always the most

sustainable ones or are the low-impact synthetic fibers as good as or even better than natural fibers. Fletcher says that our work is to look at how innovations contribute to overall system - do they take more than they give. (Fletcher 2008, 152)

In this context whether a light sportswear fabric is more sustainable fabric than natural fibers depends on how it impacts the overall picture. Does it save resources on using less materials and energy in use than they take out to nature on landfills? So what is the actual footprint of the product? Lifestyle brands could use innovative fabrics in order to foster to design more eco-effective ways as well. Lightweight and other sportswear fabric innovations are an interesting concept to be adapted to other fashion fields as well, at least as an example of good innovation.

# CHAPTER 3.

# FASHION THEORY

This chapter explores the fashion theory of fashion-ology created by Yuniya Kawamura and how I have used it in my work. I consider it important to bring the eco-effective design thinking more closely to the theories of fashion because it helps to see the immaterial change that is happening in the mindsets. I think the aim is not to be 100% perfect all the time but to have the attitude to care about the consequences of your own work.

*“Fashion-ology is a study of fashion. It is neither the study of dress nor the study of clothing, which means that the two, fashion and dress/clothing are different concepts and entities which can be or should be studied separately.”*

*Yuniya Kawamura. (Kawamura 2005, 1)*

*“I’m not going to stand here and claim to be 100% green or 100% perfect all the time.”*

*Stella McCartney (Black 2010, 32)*

### 3.1. Fashion-ology as theory base

I look at the phenomenon from the theoretical point of view of fashionology. According to the academic fashion researcher Yuniya Kawamura, fashion as a research topic is often considered not serious enough and is not usually given any intellectual consideration. (Kawamura 2011,1) According to Kawamura fashion is a reflection of the current ideology in society. She says that when the time changes fashion changes. Kawamura talks about the importance of common fashion theories from Simmel, Veblen and others in fashion design studies and poses a question if it is needed or a waste of time. From her own experience she says that knowing classical fashion theories deepens the knowledge to design with more social and cultural statements in mind. (Kawamura 2011,124,127)

Fashionology is a theory of fashion which means the socially accepted abstract beliefs of what fashion is. I think Kawamura is right when she says that the fashion as a research topic is not considered serious enough. I think fashion research can have a big influence on people to see in different ways and also deepen your own understanding. The methods that are used in fashion research come mainly from social sciences because fashion is a social phenomenon. In my topic it helps to see what changes are taking place in the paradigm change of fashion design.

Kawamura proposed the term on fashion research called *fashion-ology* in 2005 which means the sociological investigation of fashion. It deals with the fashion and dress/clothing as two different things. Fashion is a system of institutions that produces the concept of fashion as well as the phenomenon/practice of fashion. Fashion-ology is concerned with the beliefs of fashion and the social production of it in people's minds. The process in minds is considered as a substance and a life on its own. A product must go through this process in order it to become fashion. (Kawamura 2005,1)

The idea of keeping the study of clothing and the study of how fashion separate gives a vision to see the relationship between material and immaterial things. Fashion is the immaterial aspect. Fashionology deals with the beliefs and thoughts that people have and the process how it becomes fashion. I see the area of Cradle to Cradle® based design more a question of transformation in people's and designer's thoughts, beliefs and values. The shift in the design paradigm happens first in the immaterial climate of fashion and then we can see the change in actual clothing/products.

It is about seeing things before they even exist. You go to a brand store to buy a new dress. You bring your old shirt made of recyclable polyester with you to the take-back service and get a certain amount of money back for your next purchase. The clothes that you bring back are the nutrient for its next use. Every tiny substance of your shirt was once researched and it is made to be fully technically recyclable. It goes to the manufacturer (*which is hopefully close so that it does not have to be transported*) who can disassemble the shirt into fabric and accessories (*buttons for example*) which work as the nutrient for the next shirt or whatever it will be. The next product can then be made of the same material - recycled polyester without lacking any quality during the process. It would be even better if the buttons and the shirt are made originally of the same recyclable polyester so that it does not have to be disassembled at all before remanufacturing. The customer has paid a certain amount for using a shirt for a length of time and they are happy to get something new with a discount by returning the old one.

This is just an example how the process could go on a daily basis. The fully recyclable and biodegradable new PUMA InCycle 2013 collection is a test collection of this kind of process where the materials are designed to run in a circular system. The customer can take his old product to the *PUMA Bring Me Back Program* which is found in the retail store. At the moment the program can be found on 40% of the stores in Asia, America and Africa. (*Seidel 2013 interview*) The program collects both the biodegradable and recyclable (*technical nutrient*) products. Through the program the biodegradable products for example are shredded and transported to the industrial system and composted to become part of the soil. Instead of sourcing always new raw materials the whole process saves resources, reduces the waste and is a safer product. The new PUMA Track jacket is made of recycled polyester and they made the zipper from the same material. This way it is made of exactly the same material so that it is easy to reprocess. (News Puma 2012)

Kawamura separates the social nature of fashion production from the production of clothes. She refers that it can mean many other things besides clothing as well. Kawamura still says that it cannot be denied that clothing is the material from which fashion is formed. According to fashion-ology a designer is not a creative genius but an individual part of the group which is involved in the production of fashion. Fashion is a collective activity which is not born until it is adopted among many people in a society. Kawamura says that people do not wish to consume products/clothing would rather consume fashion. They wish what they wear is fashionable. As a word fashion is used usually to refer to clothing even though it has also other meanings in social life. Whatever the time is the core essence of fashion is always change. (Kawamura, 2005,1,5)

I agree that fashion is a collective action which is created in groups. Every designer have their supporters and cooperators collectively doing the fashion with them. Every company has a supply tune who produce the fabric from fibres and manufacturers who make the clothes out of the fabric. It is not just one person included but it is the whole group from the farmer to the consumer making the fashion. I guess that the time has come that single lifecycle products are not “in fashion” nor are socially acceptable anymore. At that point new cultural values have emerged and changed the picture of fashion.

At that coming time people want to consume fashion that is circular. They want their money back of the old garment to get the new one with a discount. When the system works people do not see a need to throw away their clothes. The desire to have something new is acceptable and exciting. People have courage to buy better quality than before because they know that they can use it as long they want or bring it back whenever it no longer feels good anymore. They may not understand the processes of nutrient flows of upcycling behind but they appreciate the system. The clothes go through the circle around again and again. The price of these “circular” clothes is the same as the conventional, the material looks the same and there is nothing different besides it is made fully recyclable. The acceptance of a garment will rely on its use, look, safe material and possibility to recycle it.

According to Kawamura, fashion as phenomenon has changed over times to suit the clothing habits that people have in different social positions. The added value that fashion provides exists not in clothing but in people’s beliefs. Fashion is about invisible things in visible clothing. Kawamura also refers to Brenninkmeyer who said that a dress becomes fashion when it is socially adopted on a certain time. What are changing rather rapidly are the cultural values which define the acceptance of a dress. (Kawamura, 2005,4)

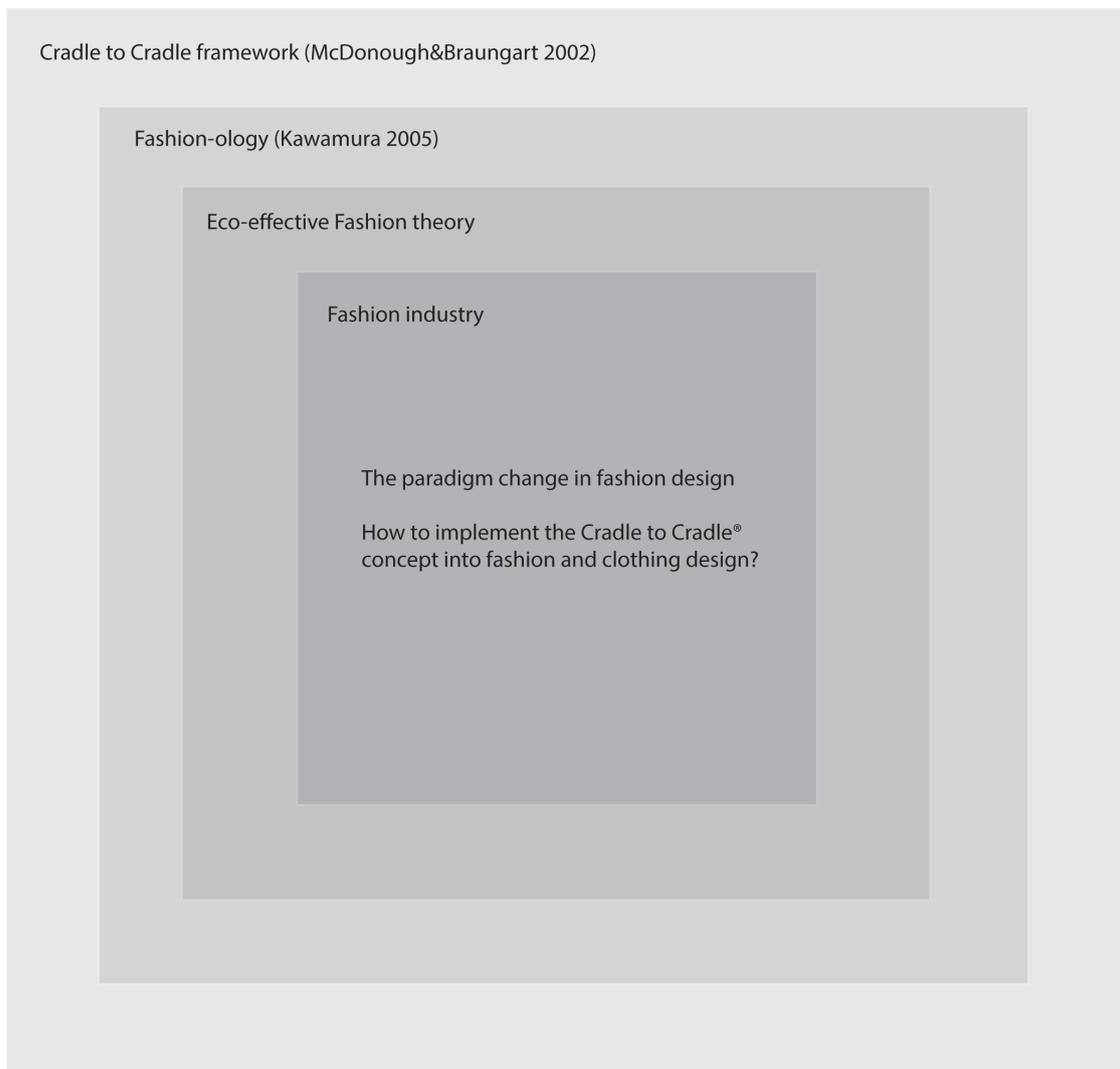
My research is a fashion-ological study as it aims to change the immaterial climate in the fashion field. The research focus is to study how to use the concept of Cradle to Cradle® and to see how it is implemented in the fashion industry. I am interested in how Cradle to Cradle® concepts is viewed and what kind possibilities it offers in the realm of fashion. My aim is to promote open minded and positive thinking towards circular lifecycle thinking. This research will not discuss sustainable fashionology as the scope of C2C® goes beyond it to a more *eco-effective fashionology or as an eco-effective fashion theory*.

## *fashion/clothing*

Since the research field of Fashion theories is complex and there are different ways to use the words fashion, dress, clothing, garment and apparel. There are not necessary any difference in the meanings since they are drawn usually according to the researcher. The differences though can vary between studies. I decided to use the the *fashion design* and *clothing design* terms.

Kawamura uses in her texts (2011) the words fashion/dress together. *In her book Fashion-ology: An introduction to Fashion studies (body, dress and culture).*” (2005) she talks about fashion/clothing. Many of the academic books and research uses the word apparel or garment which refers to the clothes themselves as well. In this research the word fashion is often used because it is about the change in mindsets and change in an abstract climate.

**Figure 4.** The research context.



## 3.2. The paradigm change in fashion industry

### 3.2.1. *Postmodern time*

How to do fashion research in post-modern world? What is the meaning of fashion in a postmodern world? My research is placed in the postmodern society where we right now live. The rules of a modern society do not exist as they used to, and this also happens in fashion. According to Kawamura's research, modern research presumes the existence of clear distinctions between different groups of certain aesthetic and style views, while postmodernism sees no legitimate and categorizing important. Postmodern time gives no clear meanings or boundaries but a lot of contradictions. Also the lines drawn between professionals and consumers begin to blur. (Kawamura 2011, 122)

Nowadays consumerism is conceptualized to role playing. Social identity no longer comes from social status based on economic success. Kawamura refers to Giddens, a researcher, who says that consumption and buying fashionable clothes play an important role in construction of identity. In contrary the material needs and superior classes are secondary. According to him an individual's style is a continual impression-making image. The different lifestyles liberate individuals from traditions and from these options they create their own self-identity which they want to present. (Kawamura 2011, 123)

The fashion business drives the enormous industry and it creates the different lifestyles and identity patterns which people follow. This relates to my topic in that the changes in our postmodern society of defining your identity through fashionable clothes can also be a threat to our environment and well-being unless crucial changes are made in the industry processes and design. I mean we end up consuming all that which enables us to define and inspire us. This is kind of a paradox.

Despite the environmental point of view also the patterns and trends, which are created to be followed are globally homogenous and drive people further more far from their real identities and traditions. Like Fletcher says that the constant pressure on people to reformulate their identity according to changing trends causes insecurity. (Fletcher 2008, 117) She goes on saying that the modern model to consume has enormous consequences on the lives of people who make the clothes. They are low paid, experience lack of rights and have unacceptable working conditions. (Fletcher 2008, 58) Cradle to Cradle® way provides a solution to the problem of products being identical, as it emphasizes diversity and the importance of local cultures. (McDonough & Braungart 2002, 144)

Typical for postmodern times is that people mix different styles and designer's role is to provide good products to meet that need. People combine and mix styles according to what each individual considers to feel and look good. The change in the styles happens rather quickly in the immaterial fashion climate all the time. The styles include both shorter and longer lasting changes. More than ever before the gap between the upper and lower layers of change is shortening. This has caused the boundaries to break between different groups of the society. The high volume of fast fashion remains unecological and an unpleasant way to design as long as it is unchallenged. What are coming as a more long lasting phenomenon, as a base layer, to the world of fashion are hopefully more closed-loop upcycling methods.

As a designer I usually start with the material. The very first step begins with the question what material shall I use. The Cradle to Cradle® certified materials are made one and only from the positive ingredients. The concept profoundly deals with material health assessment and the new processes of upcycling instead of downcycling the materials. I think this creates the true aesthetic of fashion. I think that it is important for the quicker look-good and feel-good styles and the deeper aesthetic values based on a new paradigm of the Cradle to Cradle® design to work together.

### *3.2.2. Postmodern luxury*

I wanted to talk in the beginning about luxury brands because I think one way for change happen is to really focus on quality. I see the concept of luxury as the traditional luxury is but transformed into circular lifecycle process. Burak Cakmak a former director of corporate sustainability in the Gucci Group says that the design in the future has to move beyond the present concept of luxury. Cakmak says that in addition to beauty, desire and exclusivity of the luxury it has to include characteristics which go beyond its traditions. (Cakmak 2010, 188)

Here is again the same thought about the two layers which I explained. I see that he talks about creation of beauty, desire and exclusivity he means processing the upper layer of trends and when he talks about adding the new ways which go beyond tradition he means using for example Cradle to Cradle® based design ways.

According to Cakmak the industry of fashion is bigger than ever before and the luxury brands are under pressure to answer to the requirements that their products are environmentally produced. The luxury items are traditionally made of local high quality materials by skilled craftsmanship of

artisans and have had a smaller impact on the environment than the mass market. He says that the new and creative innovations are becoming more important for the industry and it needs to offer deeper values of environmental responsibility to consumers. Cakmak considers for example the biomimetic ways to design as a one relevant option. He sees the fibres which are like spiderwebs are relevant subjects of exploration and looks forward to designs that will surprise customers and rise above sustainability. (Cakmak 2010, 188)

Biomimicry has the same thought as Cradle to Cradle® to design according to the example of nature. They both have similar ideas based on imitating nature's functions. Like Cakmak sees, there lies a huge potential in natural systems that can be adopted to fibres and fabrics in innovative ways. The evaluation in fabrics has already been investigated both in the biomimetic area and in the Cradle to Cradle® but he sees it coming more strongly in the future. Clearly there is a need for concepts like Cradle to Cradle® in the luxury industry and hopefully the cooperation will become more active.

Cakmak thinks that industry is forced to support new innovations. The interest for innovations and dynamic ways to consume has caused a wide shift from unsustainable centered ways to sustainable centered ways to design. Sustainability will be the core value of luxury products and because of that, the most desirable ones. (Cakmak 2010, 188)

Cakmak talk about sustainability in innovations. If the luxury brands shift radically to more ecological ways to design it is inevitable the other brands to do the same if they do not want to lose their customers. The luxury brands have an important role because they lead the way for other brands for the consumers around the world. A lot of people are following their actions. The challenge is big for the textile companies and the suppliers to shift into new ways but it is not impossible. According to McDonough & Braungart the new way is often more profitable as was the case with the factory making Climatex® Lifecycle. (McDonough & Braungart 2002)

As one of the design and business opportunities focused on working against waste, according to Fletcher Cradle to Cradle® gives a chance to work with material cycles. She says that the strategies seem to have a more real way to infuse with luxury, availability in markets, social fairness, technological developments, new strategies and internet to communicate their ideas. (Fletcher, 2008, 96)

Fletcher indicated here that the circular strategies can impact more strongly on the luxury markets, social problems and technology because the transition from the conventional production into a circular system actually changes all these aspects into positive one. The products are more *qualified*

(*luxury*), they are made in conditions of fair and healthy business ethics (*social aspect*) and the the recycling process forces the technology into new processes (*more clean, no waste, economical*).

### *Cradle to Cradle® and luxury items*

The Cradle to Cradle Products Innovation Institute has been part of the luxury realm through partnering with Suzy Amis Cameron and the Red Carpet Green Dress design competition. The annual academy awards Oscars is arranged every year in February. The Cradle to Cradle Products Innovation Institute has been cooperating in the competition through helping to design a “green dress” for the event. Lewis Perkins works for the Institution and writes in his websites about the “Red Carpet Green Dress” design contest for this year 2013. He says that without question media and entertainment industry has an impact on people’s interests. The aim in the competition was to make the winning dress Cradle to Cradle CertifiedCM. (Perkins 2012) The winner designer this year was Michael Badger.

The Cradle to Cradle Products Innovation Institute works for the certification process for the products and the design contest has been a good way to show for the media that it is more about the quality than being just “green”. That is seen from the context when a known actress wore a Cradle to Cradle® optimized dress. It’s vital that it is visually appealing and made of good quality materials, which is far from the stereotypical “green hippie” look.

Perkins says that the Cradle to Cradle Products Innovation Institute believes in people’s right to have a choice to choose the healthy, safe and socially responsible clothing. He says that many consumers do not know what “eco-fashion” means and they are not clearly enough informed. They may even avoid buying sustainable products because the area is too unclear to find about it. Perkins says that it is not enough to say that something is sustainable; it needs to be specified as to what is meant by labelling a garment as a sustainable product. The multi-attribute standard of Cradle to Cradle® consists of continuous improvement on material health, reutilization, energy use, water management and social fairness. (Perkins 2012)

Perkins says that the Institute goes on with the Cradle to Cradle® certification system by publishing the new version of the standard requirements, the Version 3.0. The Institution wants to improve the ability to certify products and also increase the demand for these products. According to Perkins the demand happens when the present leading designers want it, when the suppliers make a commitment to it and when consumers ask for these products. (Perkins 2012)

I think it is the designers are just as confused as consumers about the meaning of “eco fashion”. The designers are confused about what eco fashion and what is not. I usually start the design process with the material. I think of what material could be suitable for the product’s use. Too often the problem of unsustainable issues is solved just by choosing the organic material. This can be narrow way to think as organic material alone is not enough to say that something is truly sustainable. I think Cradle to Cradle® certification system gives a good base for a more holistic way to think. And it proves to the consumer, according to the certifying requirements, that it is made of researched ingredients and fulfills the required areas of the material reutilization, water stewardship, energy use, social fairness and material health. (MBDC LLC: “Overview – C2C Certified Product Standard V 3.0.”, 2012.)

### *3.2.3. From mass-production to mass-customization*

The problems of mass-production fall on the consumer habits of overconsumption, people buying more than they need. it also falls on the over-production of companies producing more than is sold. I think that through mass-customization it is possible to optimize the resources in order to meet the individual needs.

A professor of management Frank Piller and PhD student Frank Steiner discuss in their article “Mass customization: a strategy for sustainability in the fashion industry” about the more customer influenced design and production. They define the term according to Joseph Pine that it means *developing, producing, marketing, and delivering affordable goods and services with enough variety and customization that nearly everyone finds exactly what they need.* (Piller & Steiner 2010, 287)

Piller and Steiner say that mass customization provides benefits in every phase of the product life cycle. It adds value for the customer and reduces waste. According to Piller and Steiner there are three beneficial aspects: the build-to-order production, better fulfillment of the consumer needs and close customer-manufacturer relationship which enables more closed-loop material flows. The build-to-order production means that the manufacturing does not start until a customer’s order is received. Piller and Steiner say that this alone reduces waste because in the textile industry almost 40% of finished products are destroyed because of overproduction. Customers value more the products that have been customized according to their needs than mass-produced products. (Piller & Steiner 2010, 288)

According to Piller and Steiner changing to mass-customized products requires a paradigm shift in five areas: the designers think in a new way about the product structure, the factory is adaptive and strong, the technology is reconfigurable, logistics fulfills individual instead of bulk customer orders and that the customer has changed his/her buying habits. (Piller & Steiner 2010, 288)

If you look at the order of this list according to the meaning, the first thing mentioned is the designer's role. Second is the factory, the supplier. I have not yet seen many examples of mass-customization in the markets but I think it is a really good idea and have many benefits. The idea behind large fast fashion companies is to offer multiple options all the time. Only a selection of the collections in stores is sold and the rest is sold at a discount price and eventually discarded. This is a really fast, cheap system that brings very little value for customers and the environment. I like the idea that the manufacturing does not start before the order is in because it means everything is made for a need. I'm looking forward to change in the whole fast fashion area that it would shift in this direction which would undoubtedly create more value to customers, retailers, manufacturers and designers. It's downside however is that it does not suit customers who need products quickly. On the other hand it makes you think about your buying habits whether the product is really good or not.

According to McDonough and Braungart mass-customization would be a solution to the problem one-size-fits-all method. They say that mass-customization would make products possible to connect with local aesthetics and traditions without taking anything away from the product's integrity. McDonough and Braungart mention that it has been used in the fashion industry where customization enables individuals to use their local tastes and habits. They say that eco-effective design is a combination of different principles to express diversity. It is better when the form follows the evolution than only the function. McDonough and Braungart say that the needs and the aesthetics vary according to ecological, economic and cultural situations. (McDonough & Braungart 2002, 141)

The form follows the evolution and can be created through mass-customization. One good example of mass-customization is the company NIKE. You can choose the color or print of upper layer and the color that comes to the backtab, swoosh, lining, lace and outsole for your NIKEiD shoes. The shoes cost a little bit more than the standard ones but the idea is that you can create your own shoes based on your own tastes. When the aesthetics and needs change according to the three situations (*economic, ecology, culture*) mass-customization gives the customer an opportunity to adjust his/her needs through customizing the product. You choose the color, the material, the model and the attachments you want for your jacket. More value to the customer would bring for example the customer's name in the tag. It would always remind that you yourself partly created it. I think it is fun because there is no limit in this kind of design. You can implement customization to design in so many ways and with different elements.

### 3.2.4. *Designer's creative role (ecology and waste)*

The role of a designer plays an important role in paradigm change. Garth Ward is the leader of business development at the Salvation Army Trading Company. He discusses about change in his article: *"The need is for change now, but how can we moderate designers' thoughts and actions?"* (Garth 2010, 270) Ward is working in UK's largest second-hand collector and says that he has become aware that the industry is lacking a well-established innovation. The problem is that the industry is developing only efficient infrastructures. Ward explains about the present cradle-to-grave system that the product is made for single use and it is not able to be reproduced to something new again. (Ward 2010, 270)

He goes on saying that the designers focus too narrowly to the design aspect. Ward says that he is not sure that the designers know what sustainability means. The role of the designer becomes radically important when they have to consider the first, second and numerous amounts of uses. The process starts from understanding the fibre and its production and using single-fibre instead of multiple fibre mixes in fabrics because then they are easier to recycle. (Ward 2010, 270)

Ward explains about the Cradle to Cradle® system that it should be implemented into fashion now but it should be first taught in the design colleges so that both the lecturers and the students understand it. The speed for change depends on how well it is addressed. (Ward 2010, 270)

The challenge is to understand what the paradigm change means. I think it would be great to have more knowledge about the Cradle to Cradle® system and how to use the life cycle thinking in design. It would be even better if it would come from the professionals who are dealing with life cycle assessments daily. Joan Farrer writes that in the UK the sustainable fashion is supported by the government and some other educational systems. UK is leading the way in research on sustainable fashion. (Farrer 2011, 21) There is a lot of research on sustainable ways in UK and most of the books dealing with sustainable fashion are written there. I am looking forward to see the same educational change in Finland in the research and education.

According to Ward the designers think too narrowly. This might for example mean that you just choose to use organic cotton which is not a solution alone if you have not thought the reuse of the product more than one life-cycle. It necessarily might not even be the best option due to its huge water usage. Though compared to conventional cotton I regard the use of organic much better than the conventional cotton use. Another thing is to prefer to use one fibre instead of mixing the fibres together. It makes the recycling is easier. For a designer it is important to look towards the products multiple lifecycles beside the look-good or feel-good material aspect.

Ward says that he does not see the change existing in the markets yet. He says that the new fibres such as bamboo and lyocell are developed but too often combined with other fibres which limits the reprocess of them. Ward says that he sees the future of charity shops as positive. He hopes that the Cradle to Cradle® concepts would become a norm and there would become be new technology for disassembly of garments in the future. (Ward 2010, 270)

Besides Ward's article I read about the disassembly design technique from a research "Application of design for disassembly in men's jacket" (Gam et al. 2011). The research concluded findings of a disassembly of men's jacket that could be used in industry as well. Shortly disassembly means for example, when I would start to design a jacket I should consider already during the design process how fast it can be disassembled into the recycling process at the end of its life cycle. In other words how fast the jacket could be disassembled into the materials going either to biological or technical nutrient cycles of the Cradle to Cradle® system. It is easiest when materials are in their most basic form, as one as possible.

I talked with Jenny Pfau from EPEA, the company behind the Cradle to Cradle® concept, about the role of the designer. I asked what is the role is of a designer in sustainable design. She said that Cradle to Cradle® is beyond sustainability so she cannot say what the role is in sustainable design. She said that everybody is a designer because everybody is designing their lives in the way they want it to be. Not just designers are designers but everybody is. According to her everybody can take their choices and ideas and make it happen and take responsibility of it. The point should be to take responsibility for the coming generations. Pfau says that everything starts with defining your goals while creating services or products:

*You have to start somewhere at any point. You have to define yourself what is more or less your attention, what is your goal, what you want to do. And where are you right now? Which kind of inventory for example could be necessary if we are looking on products and so what are the products and what it has to fulfill and which kind of functions are possibly not to fulfill. It's an open question at all.*

*(Pfau, interview 2012)*

The core point according to Pfau is to consider if the product is beneficial which means is it positive nutrient based and not harmful for the environment and humans - from all perspectives. The questions are that how can I make it more beneficial, more positive and add value from different kinds of perspectives. (Pfau 2012)

There are similarity in fashionology and the Cradle to Cradle® approach in defining the role of the designer. According to fashionology, the designer is not seen as genius but as a normal individual part of a collective group creating fashion. I also see the same thought in Cradle to Cradle® thinking when Pfau says that everybody can be a designer. In other words they are not seen as genius but as normal people who create things. I think though that there are two things which separate a professional designer from a standard citizen: the need, ability, knowledge and skill to express creativity and the sense to take responsibility for their actions. Design is also about creativity which itself should not be underestimated.

It becomes key thing to stay open and keep a broaden mindset. The awareness is a really important strength that a designer has and can train to be better. Garth says that designers think too narrow. Pfau emphasized in the interview that it is important to have always a broaden mindset.

This sets a clear goal - to think big even though the action might be small. Look beyond even if you do not have all the facilities around you right now. Look, search and explore beyond. Think big even it remains just an idea. It is better than nothing. I think it is more also about taking the steps little by little towards circular ways to design. There are companies you can contact. There are possibilities to start. How to make a difference in the fashion world lies in trust, honesty and transparency in design. If your products are fully recyclable it gives a picture of something more than just a beautiful dress. It means that you have really given thought for how, where and why you want to produce it. It will be more than just a product that you will throw away when you do not need it anymore or sell it second-hand. The picture gets wider and wider anyway.

### *3.2.5. From textile waste to zero waste*

Waste is actually something dirty and ugly you usually do not want to give a thought to. It is quite a natural part of our daily lives as well. With the food waste you usually sort for example the milk cartons, glass and the biodegradable waste as separate. With the textiles it is not that easy. There are two options: to discard them or sell them in second-hand. According to the statistics we produce annually 40 kg of textile waste per person. We lack a good system that could sort our old clothes into new ones in a way that makes sense and is functional.

A lot of textile waste is produced every year. In the UK, the amount is approximately 2.35 tonnes. One person produces 40 kg textile waste per year which consists of domestic and industrial waste.

In the UK only 13% is collected. The rest goes to landfill where the waste contributes methane emissions and groundwater pollution along with the municipal waste. In Europe the legislation of textile recovery is forcing for recovery. According to European Union's Landfill directive you are not allowed to dump textile waste to landfills anymore after the year 2015. (Fletcher 2008, 98-99)

The problems in UK may be bigger than for example in Finland but for sure it is a problem here as well. The legislations of European Union drive the change and force the recovery of textiles. According to Cradle to Cradle® the key is to eliminate the waste totally through design. The concept focuses on changing as a whole process from supplier to consumers into a circular one. The waste therefore does not exist.

Ulasewicz and Hethorn discuss in their book *Sustainable fashion - Why now? A conversation about issues, practices and possibilities* (2008) the impact of economic growth on production and process sustainability. The fashion goods are consumable and produce waste. They think that the beginning to beginning method is more sustainable than the current linear practice in production. In their opinion these matters now firstly because so much textiles are sent to landfills when they could actually be 100% recyclable. Secondly, as the world population increases and the consumption of textiles does as well. (Hethorn & Ulasewicz 2008, 135-136)

According to Fletcher the zero waste goal would transform the whole textile industry in the level of its paradigm. She says that it would have an effect on every person in the supply chain from the farmers, to the designers to consumers. It would have an effect on what materials and chemicals to use. It would be the solution to the mountains of waste because the products would never have to be discarded to the landfills anymore. (Fletcher 2008, 108)

Two ways why I consider the Cradle to Cradle® way as a good way: The linear cradle-to-grave system produces a lot of material loss when the products become waste. Secondly the population and consumption increases which means that the materials in use need to run in cycles so that everybody's needs would be fulfilled. Moreover it changes the supply chain, every worker's daily working conditions and like Fletcher says, the whole paradigm of industry, when in the Cradle to Cradle® system eliminates the negative substances from the production process.

# CHAPTER 4. USING THE CRADLE TO CRADLE® FRAMEWORK

This chapter explores the fashion theory of fashion-ology created by Yuniya Kawamura and how I have used it in my work. I consider it important to bring the eco-effective design thinking more closely to the theories of fashion because it helps to see the immaterial change that is happening in the mindsets. I think the aim is not to be 100% perfect all the time but to have the attitude to care about the consequences of your own work.

*“Cradle to Cradle® is not an ecological concept. It’s a concept about quality.  
So it’s more.”  
(Pfau 2012)*

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

*Hildegard of Bingen  
(McDonough & Braungart 2013)*

### *The background*

Cradle to Cradle® has become a very one of a kind way to design. Pfau thinks that the reason for the success is that right now people are looking for another kind of mindset which the concept offers. The concept gives more than a “just-manage” thought. There is something more than a survival frame in the world. There is another kind of perspective to look at. (Pfau 2012)

*William McDonough* is globally recognized as the leader of sustainable development. He is working with major enterprises and government leaders through McDonough Advisors. He has also his William McDonough + Partners enterprise and is the co-founder with Braungart of McDonough Braungart Design Chemistry (*MBDC*) which offers consulting to Cradle to Cradle®. By the invitation of Californian Governor Arnold Schwarzenegger to create global standards for safety and healthy products he was the co-founder of the Cradle to Cradle Products Innovation Institute created in 2009. The GreenBlue industry group around Cradle to Cradle® issues were founded by him as well. (Cradle to Cradle Products Innovation institute 2011)

*Michael Braungart* is the founder and CEO of EPEA International Umweltforschung GmbH and co-founder of MBDC McDonough Braungart Design Chemistry in Charlottesville, Virginia. In 1987 he founded the Environmental Protection Encouragement Agency (*EPEA*) in Hamburg and the focus of the enterprise is to create products aimed towards a more life-cycle thinking with IPS (*Intelligent Product System*). He teaches at several Universities and he works with evaluation of new products in MBDC and EPEA in cooperation with smaller and larger industries. (Cradle to Cradle Products Innovation institute 2011)

The founders met in 1991 and when they met they had a common goal, which was to design in a positive way for the generations instead of just talking about the problems and trying to be less bad. A year after they launched the Hannover principles for the city of Hannover Germany for EXPO 2000 World Fair event. McDonough and Braungart co-founded the MBDC LLC in 1995. (MBDC LLC, Overview Version 3.0. 2012, 1 & McDonough & Braungart 2002, 7-13)

The Hannover principles have nine statements to guide designing. They are for instance about nature’s and human’s rights for a healthy world, accepting the consequences and limits of design and seeking improvement by sharing knowledge. (McDonough & Braungart 2013, 9-10) The Hannover principles were drawn in 1992 and are still up-to-date and can be used as a guideline in designing.

The authors just published their second book called *The Upcycle: Beyond sustainability - designing for abundance* in April 2013. They consistently think that holistic quality and good design can bring health, abundance and safe environment both to people and nature. According to McDonough and Braungart, people do not have a pollution problem but they have a design problem. They think that we can design a more positive world. Good design can bring pleasure and wealth, health and proliferation. (McDonough & Braungart 2013, 10-11)

## 4.1. Vision for change

The present *cradle-to-grave* way is a linear way to do things. The resources eventually end up as waste when they actually could be used a second time.

According to McDonough & Braungart, products are made of some resources, designed, sold and eventually discarded. The landfills are full of papers, plastic packages, computers, carpets, diapers and so on. The picture of a typical landfill is really complex. The cradle-to grave manufacturing dominates the market and 90% of products end up away into a landfill. (McDonough & Braungart 2002, 27) The products consist of unhealthy substances which cause for example stress, asthma and allergies. In the industry there are almost eighty thousand different chemicals used (*of which have five add-substances*) of which on average about three thousand is investigated for their cause on living systems. (McDonough & Braungart 2002, 41-42)

For the cradle-to-grave system many strategies tried to provide answers with “green” or “environmental” strategies however these usually just slow down the destructive system. Usually when recycling or reuse is referred, it means that some product is made into another product and sold as “recycled” product. The true basis of *how* it was recycled, *how* it affected the quality of the new product and *what* are the true materials in it remain a question.

McDonough and Braungart say that *downcycling* diminishes the quality and materials are lost. This happens for example in some clothing fabrics which are made of recycled soda bottles. The soda bottles contain toxins such as antimony, ultraviolet stabilizers, catalytic residues which were never suppose to be next to human skin. (McDonough & Braungart 2002, 56-58)

The new collection of PUMA consists of t-shirts and jackets which are made of recycled soda bottles however it fulfills the overall requirement level of C2C® basic certification. It means that it does not contain any banned list chemicals, is appropriate either for technical or biological metabolism and the product is 100% characterized by its generic materials. Besides meeting these material health requirements it fulfills the areas of material reutilization, renewable energy use, water stewardship and social fairness at least on basic level. The materials are therefore upcycled.

At this point it is good to see the difference between the common way to recycle (*downcycle*) the soda bottles into a new product, a fabric or other plastic products, than a Cradle to Cradle® optimized product which made of used soda bottles. The materials, energy use, social aspects and water usage were carefully optimized for example in making the Track jacket of the InCycle collection. In order to avoid the misconception that it would contain harmful chemicals I want to clarify that the product was researched according to the C2C Certified Product Standards.

The design in C2C Certified Product Standard lies on short, middle and long-term goals. The short term goals consist of investigating the materials and chemicals of a product. The medium term goal is to have a beneficial cost, aesthetic, material health and reutilization to the product and to use renewable energy and honour clean water and social relations in the process. The longer term values are to think precautionary and trust the supply chain. It is about checking the single chemicals which gives a good start but not necessarily perfection. It is about quality statement which is formed from small quantity indicators. (MBDC LLC: “Overview – C2C Certified Product Standard V 3.0.” 2012, 2-3, )

#### *The companies:*

*“So MBDC and EPEA are just both consultancies behind Cradle to Cradle® concept and we do nothing else”*

*(Pfau 2012)*

In my interview with Jenny Pfau the the Geoecologist, building Biologist IBN from EPEA (*the Environmental Protection Encouragement Agency Hamburg, Germany*) told me about the company she is working for and the Cradle to Cradle® concept. She explained that the mission of EPEA is to spread the word of Cradle to Cradle®. It is divided to MBDC as well so there are two companies working for the concept. The MBDC is owned by William McDonough and Michael Braungart. MBDC is located in Virginia in Charlottesville. Behind the concept works both EPEA and MBDC (*McDonough Braungart Design Chemistry*). (Pfau 2012)

*EPEA Internationale Umweltforschung GmbH* is a research and consulting company and the starting company of Cradle to Cradle®. Its headquarters is in Hamburg, Germany. According to Pfau the company is really international. People who work there come from all around the world. There are working scientists, designers, managers and people from production facilities. EPEA wants to be international so that they would have more than just the German way to look at things. Pfau highlights that it is important that they have a broad mindset. (Pfau 2012)

EPEA is working both in the headquarters in Hamburg and in different placements in different countries. They want to have their professionals placed locally to give advice and direction which only their experienced personnel can give. It is a multinational company doing work in many fields. That is why they have both scientists and designers working in their company. They need to look at products and services in all fields. The company is working through networks. The aim is to be connected both to the supply chains and supply tune behind the product production so that the company would not just be a certification but really taking care of things. The company wants to improve connections and co operations and believes that if things are done in close cooperation with companies it will provide the best results. The information between the companies and EPEA is really important and it wants to be informed and involved. (Pfau 2012)

The work is concentrated on developing and optimizing the development of new products. The customers are mainly located in Europe, but it is working in other countries outside Europe as well. The main focus is to be a really holistic company and work closely with the companies and suppliers involved. (Pfau 2012)

## 4.2. The design principles of the framework

The condition in Cradle to Cradle® design is to make the products reutilizable. The reuse of the product needs to be considered the designing phase of the product, it needs to be a starting point. The ingredients in the supply chain and manufacturing should be beneficial for the environment and people. Then they can be reused and reused over and over again without lacking quality. This sets the stage to look at the design process in a fundamentally different way.

The Cradle to Cradle® framework wants to fill all the corners of *ecology (environment)*, *economy (profit aspect)* and *equity (social aspects)*. The focus is to fulfill all the three corners of triple top line instead of focusing only one part of ecology. It is important that a designed product is beneficial in costs as well. The concept aims to have a holistic view on products so that they are good by their economic and social aspects too. (Pfau 2012) One of the strengths as to how it differs from other concepts is that it combines environmental chemistry, material flow management and industrial design. The aim in the metabolism is to promote higher quality through the Intelligent Product System (IPS) which Braungart has created. (MBDC LLC 2012, Overview Version 3.0., 4)

The design principles lie mainly in three aspects of *eliminating waste, using renewable energy and celebrating diversity*. Waste is eliminated when materials are seen as nutrients either in biological or technical flow. They are safe and leave a positive legacy in the areas of triple top line (*economy, equity and environment*). The effluent and influent streams of water are taken into account so that the water as a by-product is as pure as drinking water. The use of renewable energy such as solar, wind, hydropower are quality energy sources instead of fossil fuels and other non-renewable sources. The diversity means basically taking care of the social fairness in the company, encouraging staff in creativity, technological innovations and supporting the local diversities and cultures. (MBDC LLC 2012, Overview Version 3.0., 3-4)

The categorizing in the framework goes simply to *the products of consumption (biological cycle)*, *products of services (technical cycle)* and *the externally managed components (EMC's)*. In the biological cycle the materials do not need filters because they are assessed so that when they came into contact with biological system, they support it. The biological products can be either composted or for example like the bioplastics, go through a technical process to be safely disposed. A product of service is made of technical nutrients which are usually dismantled and if necessary molded again

or processed through chemical transformation. Technical nutrients are managed through leasing and contract services to the user and vice versa back to the manufacturer. An EMC is a component which can be processed as one whole component in technical nutrient cycle and it requires that the supplier guarantees a take-back system for it. (MBDC LLC 2012: Overview Version 3.0., 5-6)

*A product of service, a technical nutrient*, is like the t-shirt made of recycled polyester I earlier told about which can be returned to a store. It means an ownership to the use but not to the material. I envisioned that the polyester shirt could be bought in a contract which gives a chance to use it for a certain time. You pay for the service the garment gives you. An example of an EMC from the clothing could be the attachments like buttons and zippers. They are processed as whole but still need to fulfill the same requirements and not contain negative chemicals. So to sum up the materials are designed to run as consumable products which biodegrade, products of service which are technically reprocessed and the EMC's which are processed as whole pieces by the supplier. In biodegradable products where they have to still be process by the manufacturer (*bioplastics*) the leasing method is also used to guarantee that the customer brings the product back.

#### *A holistic way to see*

Pfau says that they do not want to compare the Cradle to Cradle® products to the kind of equal products or “green products” because they usually are not high quality and do not meet the needs of the users. The difference between ecological concepts and Cradle to Cradle® is that they are not picking just one item out as usual but really look at a broader view of everything. Pfau says that the view of their concept is an ambitious goal but says that is the point if we want see things changed. (Pfau 2012)

*“You have not to limit yourself and you should have the possibility to have the same product but really in a safe way or in a positive way.”*

*(Pfau 2012)*

Pfau explained to me was that as a key aspect is that you should have the possibility to have the same conventional products as previously but now in a safer way. The safe way means that the ingredients are tested and proved according to the material assessment. EPEA researches the ecological and toxicological dangers of the ingredients of the product and their constituent parts. They have a list of preferred materials of for example good dyes to be used in textiles. (EPEA 2013)

It is about stepping out of the conventional “box”. Pfau explains about the angle to look that you need to step out of the “box” which means the way things are done, look at them outside of the “box”, then step in again and hopefully then you have a more holistic view. (Pfau 2012)

I think she is right because what is usually limiting to see the broader view is exactly “the box” around us. Too often it is the economical pressures, business or lack of knowledge which prevents stepping out of the box. In clothing design it could mean that you always choose the same kind of materials, techniques, dyes and prints for clothes just to get it to the market as fast as possible. What exist outside of the traditional ways to design are the innovations, the more cyclical ways to manufacture and design clothes and the more diverse picture about the world around us. What I like in the Cradle to Cradle® concept is that they implement the concept in a practical and simple way to industry. I mean the process might not be simple but the idea is clear. The aim is not to do just something green but something beyond in a really holistic way so that it works and makes sense to everyday consumers. We cannot design products that are not fulfilling the needs of the consumers. It would be a waste of time.

### 4.3. The certification requirements

The Cradle to Cradle Certified™ Product Standard is administered today by the The Cradle to Cradle Products Innovation Institute which took over the seven year old Cradle to Cradle Certified™ Program in 2010 licenced by MBDC. The Institution is making a large scale transformation and is working with academia leaders, governments and the industry. It is a comprehensive certification and provides healthy and better quality products. The process in certification is transparent and independent to each customer. (MBDC LLC 2012, Overview Version 3.0., iii & The Cradle to Cradle Innovation Institute, 2011)

.....  
*The standard system is constantly assessing and improving products based on five categories:*

1. Renewable energy and carbon management
2. Water stewardship (*clean water is valuable and a human right*)
3. Material health (*safety and good for health*)
4. Social responsibility and fairness
5. Material reutilization (*in biological and technical nutrient cycles*)

The certification levels are on a system of 5 different levels: *Basic, Bronze, Silver, Gold and Platinum*. Each of the categories is researched, marked on a scorecard and the final level is the average level of these five categories for the product's certification. In the Material Health section the aim is to use only the materials that have been optimized and do not contain any banned list chemicals. The banned lists for biological and technical cycles are different kinds but overall they were selected due to their hazardous factors. The Material Health means investigating each material by their hazard, single chemical assessment to overall risk and cyclability assessment and the final ABC-X assessment of it. (MBDC LLC 2012, Overview Version 3.0., 7-23)

The certification makes a difference in the market and the products that have the certification bring also economical success. The economical benefits come from the fact that materials run in cycles so they do not always have to be sources again, if optimized for technical cycle, which is expensive. Being a very transparent concept I think it brings good possibilities to make a difference in the fashion industry as well. It is a positive and optimized design concept which makes sense to the health of our lives at all times.



*Figure 5.*

The Cradle to Cradle® logo.

## 4.4. The Cradle to Cradle® in textile and fashion industry

We talk also about Cradle to Cradle® in the textile industry. Pfau mentions few companies as an example of developing materials and making products out of them. In the fashion industry there are for example companies like Trigema® and textile manufacturers Backhausen and Gessner AG. The Gessner AG is the company who made the Climatex® Lifecycle fabric. These are examples of textile manufacturers if just looking the names of the companies. Pfau says that the supply chain as well and really important including things to take into account. The questions to be asked in the supply chain are for example that who is spinning the yarn, who is taking care of the post chemicals of the yarns? What are the dyes and what are they leaving behind? All the supply chain members are important because they are the first who are in charge for EPEA because they are requested by their clients. (Pfau 2012)

### *Designers cooperating with EPEA*

I asked Jenny about how to go about the design process in fashion considering the Cradle to Cradle® standards, especially choosing the materials. It is inevitable to think which material is good and I asked if it is necessary first to come to them. She answered yes and no. It depends on what I want to do she said. The material selection depends on the use and if it can function either in biological or technical cycle. Not everything is useful for one application. The work with EPEA is mostly negotiation because the answers are found together - in cooperation. Pfau clarifies that the key in Cradle to Cradle® is to work together. The aim is to find the solutions to my questions at the right time and for my own region because the answers for me are not necessarily universal suitable to all regions. (Pfau 2012)

So in EPEA they really think of the local traditions and how my work is beneficial for my region. They do this to provide more richness and diversity in local cultures. There is not just one answer to my questions but it is far more a negotiation when I have a clear concept what I want to do, where and with whom. EPEA is to work as a strong consultancy to help, give advice and support companies and individual designers.

### *Fashion designers working together as allies*

Previously done, fashion designers order a small sample of fabrics to trial. The Swedish designer Matilda Wendelboe did it; she made a jacket out of Backhausen textiles. Pfau says that people are already coming together. She advises that as a single designer you may not have enough finances to order much fabric and in that case the platforms can give information and contacts. (Pfau 2012)

I see that there are many possibilities to start. I can try to contact some platforms to get information, for example Refinity® and Cradle to Cradle Products Innovation Institute. You can place your own platform and work with other designers together and order sample fabrics together to try them out. I think it is really important to have partners so that you are not alone in the process so I would regard the designer cooperation a really good option to start. And the result can be: *“And then possibly something is coming up”*. (Pfau 2012)

### *Material discovery and connections*

According to Pfau a starting point would be to use the Cradle to Cradle® certified products/textiles. It means that they are proven and checked and there is somehow “a stamp” on it. Another advice is to get small amount of textile just to try it out get a feel how it looks. It is a good option if you want to see how to sew it and how to put it into fashion as well as how it behaves when you for example wash it. However it can be a challenge, she says, as you need contacts in order to do so as the fabrics are not available from your local fabric store. (Pfau 2012)

Especially with textiles it is not so easy. I think that constant discovery and seeking for knowledge, sample ordering with others for testing and researching perhaps gives a start. This is what you can do both as an independent designer or working for a company. On a larger scale in industry it is a holistic process together with the suppliers, manufacturers and other Cradle to Cradle® stakeholders to make new clothes in a new way. This is what bigger companies are doing like PUMA and Trigema. The whole process from farmer to consumer stage is changed and accordingly the whole designing view.

# CHAPTER 5. ANALYSING THE CASE STUDIES:

*Mona Ohlendorf for Trigema Change®, Fioen van Balgooi from Refinity® and Stefan D. Seidel from PUMA SE®.*

The fifth part explains the process of how I have used content analysis in my study. I use the data-driven content analysis and explain how I created the categories. The interviews and some press releases from PUMA sports lifestyle company work as my data. I have the theoretical frame about the information and I explain how I understand it. I hope to give enough of a detailed and holistic view about the concept through cases since there are three of them and a lot of information on each.

## 5.1. Categorizing the data

As earlier mentioned, I will use content analyze as a method to see categories in the text I have received from my informants. Tuomi and Sarajärvi say that it is one text analyzing method and it is about *to see the invisible*. Point is that there is nothing more a person can see than on the basis of what he/she has experienced, so it is not about truth but about realizing the existence through thinking. (Tuomi & Sarajärvi 2009, 104)

In content analysis it is not enough to just categorize documents, which can be interviews, books, articles, discussions, reports or any written documents, to a summary but *to make conclusions of the re-organized data*. The most important thing is to search meanings in data-analysis behind the written text and explain it. (Tuomi & Sarajärvi 2009, 103,106)

Through content analysis the aim is to put the data into compact and summarized form without losing its information. The aim is to *add meaningful, clear and solid information* through putting it in a summarized form. (Tuomi & Sarajärvi 2009,108)

My goal is to find new notions and information that has not been earlier seen, something that is particularly found in this fashion research. I hope to share information and that the results would inspire designers, companies, organizations and other stakeholders to sustainable issues in fashion and textile industry.

## 5.2. Data-driven analysis

First, according to Tuomi and Sarajärvi, I start by simplifying data. I make groups and then make an abstraction. (Tuomi & Sarajärvi 2009, 108) On the first stage in my analysis I have the interviews from Mona Ohlendorf, Fioen van Balgooi and Stefan D. Seidel from PUMA SE, which consists twenty pages of answers. The interview with Jenny Pfau was five pages written text from the conversation. I categorized Jenny's interview into main areas and analyzed it in the chapter four because it deals more about the concept itself.

On my analysis concerning the case studies I first went through the interviews and simplified the data under certain titles. The first round was in other words about simplifying it and gathering main and subgroups of information.

On the second time I went on simplifying the sentences I had gathered from the first version of the data. I started to gather groups case by case. I took my main research and the subquestions to remember what are my main points to see.

On the third time I had my groups or themes and under them some sentences clarifying it. To my main questions I formed a conclusion, two tables (5.4.), which are answering to the questions from each case. This way it was easier to have a clearer picture about the answers. The analysis was intuitive and I could find similarities between the cases. I think it was due to the research questions and because the concept requires certain identical standards to be fulfilled. What I consider I could have done better would have been to set up skype interviews with all the cases because the data would have been then more diverse. However, for the extent of this research, I think this knowledge was enough as well.

The groups I made from the data of Mona Ohledorf for Trigema® were dealing with the facts of the company itself, recyclable products, manufacturing processes, materials, the energy, take-back systems, development, marketing, problems of the market, upcycling, barriers of growth, need for common products, future and designer's role. The groups of Refinity® (*Fioen van Balgooi*) were about the company, identity and fashion, circular economy, looking different concepts, eco-effectivity, emotional design, design aspects, working with eco-effectiveness and Cradle to Cradle®, vision for future and the designer's role. The groups of PUMA SE® (*Stefan D. Seidel*) were the brand and the concept of PUMA InCycle, design, changes in design, the products: materials, attachments and recycling, biodegradable products, the aim of C2C®, the good and bad sides, use phase, the Bring Me Back program, marketing and future.

## 5.3. The outcomes drawn from the data

The categories I gathered from Mona Ohlendorf for Trigema Change® interview were 15 different areas with one headline on each, van Balgooi's 9 and for PUMA I gathered 11 of those. I have organized them here according to some titles. The summary of my categorizing can be found from the Appendix in the end.

*The companies and designers want to make a difference through C2C design.*

*Our customers mainly value the quality and the moral standing of Trigema.*

*(Ohlendorf 2012)*

The company of Trigema® said that comparable concepts to Cradle to Cradle® are not found (Ohlendorf 2012) which I understand that it means the profound and ambitious goal for high level products and recycling with quality. Van Balgooi as a designer herself and owner of Refinity® consultancy wants to make a difference in the fashion world where people would respect the environment and humans through their decisions. (Van Balgooi 2013) PUMA wants to aim to become a desired and known sustainable sports lifestyle company in the world and the new concept of PUMA InCycle is the first step towards totally reducing the waste of their products at the end of their life cycle. (Seidel 2013) PUMA has taken important and big steps toward to their goal to be a desired sustainable sportswear company. They have large volumes in their production, which has required remarkable changes in manufacturing process to make the products recyclable. They have taken big steps to bring Cradle to Cradle® garments mass-produced to markets which are needed to make them more common.

The companies and designers want to make difference on choosing to design C2C products and want to present a safer and a better future for next coming generations. They want to pursue good products and clothes that would not harm people and nature. They think that Cradle to Cradle® gives a holistic way to do that. In order for success in the market they also consider it an economically beneficial concept.

*Fashion and clothes reflect also the emotions of our identity.*

*How does someone feel himself wearing a garment.*

*(van Balgooi 2013)*

The relationship between fashion and identity is clear. People buy, consume, discard and buy clothes according their appearance and identity desires. Simply, we do not buy clothes just because we need something to wear but also because it affects our feelings about ourselves and gives us pleasure. Van Balgooi said that “If fashion only was about wearing clothes to protect you for the elements it would a lot easier, but fashion is also an important aspect of our identity” (van Balgooi 2013) According to her, it is an emotional thing of how someone feels himself in the clothes. (van Balgooi 2013)

The emotional side gives the clothing design a new aspect to really consider recyclability because the fashion changes fast according to how the feelings of the customers change. The emotional side of clothing is something that designers can affect also. I think that products, which are high quality and well made are emotionally long lasting for customers as well.

#### *In circular economy there exists only fully recyclable products*

Fioen van Balgooi mentioned in the interview the term circular economy, which means that everything is fully recycled, the products are useful and produce no waste and the resources are shared. (van Balgooi 2013) According to Ohlendorf the strategy of how everything is recycled starts with the question “How to make it positive and useful for recycling and environment?” (Ohlendorf 2012). Cradle to Cradle® concept talks about upcycling which means that the materials are recycled in a way that it preserves the genuine quality of materials. Like Mona said, the biological nutrient is the base for the new plants to grow where the cycle gets closed. (Ohlendorf 2012) Moreover, in the technical cycle the technical nutrient is the base for the new products. PUMA launched the biodegradable products to aim for more circular design. Their InCycle collection 2013 is the first collection to carry the Cradle-to-Cradle Basic certificationCM. (Seidel 2013)

The circular economy, ecology and equity are the key points in C2C® design. The goal thought is that everything runs in circles and maintain the quality of the materials and environment. The condition for the circularity is that they must be fully recyclable.

#### *Eco-effective fashion design covers the whole picture*

The three different areas of eco-effectivity lie in ecology, economy and culture/social fairness. In eco-effective design the important thing is to look at the overall effect of our design choices on environment covering also people. I think one really important aspect is to look at the use of energy during product life cycle too.

As to Fioen van Balgooi, the eco-effectivity means that she does not limit her thinking only C2C® but combines the best aspects of different concepts (biomimicry, Cradle to Cradle®, emotionally durable design) and names it eco-effective when the design covers the whole aspect. (van Balgooi 2013) I like that she wants to look with a broad mindset also considering other ways and keeps the aim in eco-effective design.

PUMA wrote in their press release that 100 000 of their conventional sneakers produce 31 trucks of waste from the production and consuming during one product lifecycle. The biodegradable InCycle sneakers produce 12 trucks of waste before ending up to composting system. (Neuber 2013, PUMA) The C2C® design reduces the total use of energy during the whole product's life cycle, diminish the use of new raw materials and produce no waste.

#### *Cradle to Cradle® requires committed changes in design and manufacturing processes*

*The aim of the Cradle-to-Cradle® design concept is to have an proved consumer quality for the user, pose no health risk for anyone who comes into contact with them and deliver both economic and ecological benefits.*

*(Kerstin Neuber, 2013. Corporate Communications - PUMA SE)*

The Cradle to Cradle requires changes in design and manufacturing processes. According to PUMA, it requires to use more innovative and new design concepts. It requires long-term visions and the use of innovative materials. (Seidel 2013) According to Ohlendorf, it requires designing for two cycles where every single substance is checked according to C2C® concept. She explained how, for example one single color contains many pigments, of and which themselves contain multiple more pigments. They evaluated new materials with EPEA for two years. (Ohlendorf 2012) The aim in Cradle-to-Cradle® design is to have better quality and safety for the consumer with economical and ecological benefits. (Neuber 2013, PUMA)

In order to aim for more pure and safe products it basically requires changes and total commitment in material decisions, production, suppliers and following the principles of C2C® certification. The changes require new material innovations, new attachments and way of production. The aim is to design economically and ecologically effective design concepts that would serve people in the same way, or even better, as the conventional products. And at the same time being top on the looks as well. Besides the materials the design, look and the cutting of the garment make the first impression to the customer so they must be high quality as well.

### *New material innovations are needed*

*We filtered all substances out of the dyes that have been categorized as “risky” in accordance with a human ecotoxicological risk evaluation and replaced them with substances that are defined as positive.*

*(Ohlendorf 2012)*

Making Cradle to Cradle® products may require investments on material innovations. There are some Cradle to Cradle® certified fabrics available but a lot of them are made as upholstery fabrics. They may not be suitable for the use the garment will be created for. This part, the material innovation requires extra effort to search for the right materials for the right use and if they do not exist you need to possibly start to develop them in cooperation with the factories.

Material innovations are needed because mostly the present fabrics are not made in a recyclable way and produce a lot of waste and are unhealthy for human skin. In addition, they are made in destructive conditions both to nature and men. Like Ohlendorf said, their products are recyclable, do not consume resources but make the best to utilize them with quality and include no harmful ingredients. (Ohlendorf 2012) The material innovation aims for the very best quality and begins with the thought to evaluate positive products in the first place. By this far the materials in Cradle to Cradle® certified clothes have been for example organic cotton, linen and wool and recyclable polyester.

### *Take-back systems should cover all the aspects*

*Their line of sports and lifestyle products are truly designed based on the Cradle to Cradle® design principles. Their new collection, along with their cooperation with I:CO and their Bring Me Back system, put them at the forefront of holistic beauty, innovation, and quality.*

*Prof. Dr. Michael Braungart,*

*Founder of the Environmental Protection Encouragement Agency (EPEA) Internationale  
Umweltforschung GmbH (Neuber, 2013)*

Take-back system is something that is becoming I think a more common concept to all the clothing retailer stores around the world. I recently saw the first one live in H&M in Finland. It was for the

customers returning all clothes they have, not just H&M. And the customer gets 15% discount for the next purchase. This is really positive step I think and shows that the take-back systems are becoming a common way in the future to discard used clothes.

What is still missing is the planned recycling. I mean the clothes that are returned right now cannot be recycled without lack of quality in ecological and economical effectiveness. The quality usually diminishes and they are downcycled. In Cradle to Cradle® design the products are designed to be fully recyclable and upcyclable, by filtering out the harmful substances which cause the quality to diminish.

PUMA has taken steps to evaluate their own take-back system. They do it in cooperation with I:CO which collects the clothes partly for PUMA. Their own take-back system is named *Bring Me Back system* which can be found in stores in Africa, Asia and America. The recycling processes itself take places in Asia. This is worth thinking about as well, how much energy is needed to transport the clothes back to the factories and could there be easier ways to recycle them closer? The energy consumption is without doubt one of the biggest challenges nowadays. The good news is that I think take-back systems are really coming and staying. The challenging thing is to make the system more ecologically and environmentally beneficial. Like Ohlendorf said, an intelligent and customer friendly system is needed that covers all the aspects. According to Ohlendorf, the take-back system is a question of time and development. The take-back system as whole should be close, as it makes no sense at all making highly recyclable products and transporting them far away for the next process. According to her, it negates the positive impact of the whole thing. (Ohlendorf 2012)

### *Technology and costs are the biggest barriers of growth of C2C*

*Green fashion has to provide the same style, the same level of coolness and attractiveness as conventional fashion. Also the price must be kind of the same.*

*(Ohlendorf 2012)*

*The biggest challenges are material limitations and limitations in recycling technology for our products.*

*(Stefan D. Seidel 2013)*

I asked my informants about the challenges concerning C2C® design. Overall, the main limitations are concerning the materials, the responsibility that the customers have for disposing them correctly

and the need for big concepts to move on Cradle to Cradle® design as well. Materials are costly and few. Concerning the product design they should fill out the same requirements as common products to become more popular. The design should be based on the needs that customers have and try to aim to fulfill those needs. Otherwise the products have no value at all.

Concerning the upcycling, the products should be disposed in a right way and be processed through a recycling technology. This sets a responsibility also for customers for taking back the clothes to the right places and taking effort on that.

### *Cradle to Cradle® design is growing*

*The C2C® concept is the most intelligent and most promising way to generate products and ways of production, that are able to satisfy the needs of today's lifestyle, support the need of economic growth and are able to support live, health and the preservation of all kind of resources - now and in the long run.*

*(Ohlendorf 2012)*

As to answer to the question what is good design in the long term I think we can find many answers through Cradle to Cradle® design. Many problems of today's fashion world due to the short term thinking filling out only the needs of the present. What I really like in Cradle to Cradle® design is that it looks further. According to Ohlendorf it helps to design products for today's lifestyle now and in the longer run. (Ohlendorf 2012) Van Balgooi wants to believe it to become such a common way that it need not to be called C2C® anymore. (van Balgooi 2013) PUMA hopes for good economic success with their collection so that the concept could expand. (Seidel 2013).

As a conclusion to my data, I can say that there are possibilities for today's market for this concept to grow to become the common way to design that it need not to be even mentioned separately. What it really needs is to have the biggest companies onboard with so that the development would be more effective. Perhaps PUMA as a big brand has now opened the way to do it more widespread. Moreover, it needs the common aim and commitment from textile manufacturers, other suppliers, designers and customers for the good purpose.

## 5.4. Theoretical frames for the research questions

I made two tables to help to answer my research questions. I want to clarify that these exhibit only the things I found from the data and they do not present all the detailed information. You could go so much deeper with the cases but I can not include all the details because the length of my work is limited. I consider more important to see the overall picture, see the examples for this concept in fashion and what are the steps, the changes, to be taken.

For the question on how to implement the concept into fashion design I look at first the area of fashion design and what kind of product it is. Then I looked at how the production and manufacturing is different. The materials play an important role and basically the C2C® materials and the process of how to make them determine the product to be a C2C® product.

The bigger companies such as PUMA SE® and Trigema® have had the chance to create their own innovative materials through their own manufacturing according to C2C® principles. The last section for upcycling in the table describes how the created product can be recycled, which is the goal and the point in circular product design which Cradle to Cradle® in my opinion presents.

The changes come in the first goal to produce safe and positive garments without waste. The clothes must be useful for environmentally safe recycling, which requires the right choices in materials and in substances, which is a highly scientific process. Overall the picture I get is that the concept is ecologically effective both for people and for nature and creates positive downstream processes. The products are good economically as well, though it would need more political support and interest from big companies before the change is really seen in everyday consumer markets.

*In the table 1.* I have the examples of the three cases how they have implemented the Cradle to Cradle® concept into fashion design. As from the interview of Mona Ohlendorf, who was the creative director of Trigema Change® collection, you could see how strict and precise the development of an eco-effective garment is. Trigema® was the first company to evaluate a C2C® optimized cotton garments to market in 2006. It required a work of two years to do it with EPEA GmbH. (Ohlendorf 2012)

**Table 1.**

Implementation of Cradle to Cradle® concept to fashion design.

	Field of fashion	Cradle to Cradle® framework  product example	Manufacturing and production process	Materials	Upcycling  “Eliminate waste” Biological nutrient cycle Technical nutrient cycle
Mona Ohlendorf for Trigema®	Environmentally and socially conscious fashion design  Former Managing director/ Creative director of Trigema Change®	<i>Eco-effective cotton apparels for Trigema Change®</i>	-Harvest of organic cotton in Turkey, cleaning, combing and spinning in Greece, rest of the production in Germany. -Every single substance is checked according to C2C concept and must be safely recyclable. -Seams and fabric are dyed with the same dye.	-Fibre for the garments is organic cotton, which is a biological vegetable fibre. -It is biodegradable and can be returned to ecosystem. -All components of the product (fibre, dye, finishing agents, yarn) can be safely returned to ecosystem. -The possibilities for attachments is limited.	Trigema developed products for the biological cycle. -100% positive downstream recycling back to ecosystem. -safe, positive, non-toxic, high quality, good recycling environmentally and ecologically. -not consuming resources -Take-back systems are a question of development and time. Need for easy and comfortable returning system, which is close.
Fioen van Balgooi from REFINITY®	Research and advice for eco-effective fashion	<i>Many cases with different designers</i>	Refinity helps designers with materials and techniques and closed-loop systems.  -Connections to different companies producing C2C, organic, fair trade or better quality materials  -Share information about the dyes and new techniques.	-The aim is to use mono materials, one material, not mixing materials. It enables a product to be recyclable. -Using C2C® materials -Use materials with the less possible toxic substances	Eco-effectivity covers the whole aspect (ecological, economical and social/cultural environment) -Products can be composted, or mechanically and chemically recycled. Prefer to give a product a second life before composting. -non toxic, easy to recycle and market, no waste.
PUMA® SE	Sportslifestyle Sustainable Footwear, Apparel and Accessories	<i>The InCycle collection Spring/Summer 2013 includes:</i>  The PUMA Track Jacket (recyclable, technical nutrient)  The PUMA Backpack (recyclable, technical nutrient)  the Sneakers “Basket” (biodegradable)	-Manufacturing in Asia. -The homogeneity of materials in the products. -Biodegradable are only made of biodegradable materials, organic fibers without any toxic chemicals. They have to follow international standards for composting. -The sourcing and manufacturing process must be as low impact as possible. -New material innovations -impact the environment 31% less	-Use solely or fully recyclable materials, use biodegradable materials. -eliminate pesticides, chemical fertilizers and other hazardous chemicals  Jacket: recycled polyester (used PET bottles, the zipper is made of the same materials as jacket) Backpack: recycled polypropylene Sneaker: a mix of organic cotton and linen, sole biodegradable plastic APINATbio®	Recycling by the Bring-Me-Back Program (take-back system): Jacket into polyester granulate, backpack to the original manufacturer in China, sneakers are shredded and transferred to an industrial composting facility system as biodegradable nutrient. -C2C products give improved consumer quality, pose no health risk, is beneficial economically and ecologically. -Reducing the need for crude oil, energy and the amount of waste created. -uses less energy than raw material creation, reduce air pollution from waste incineration

In practice what it required from the company was close cooperation with the suppliers of organic cotton, producers of C2C certified chemical dyes and finishing agents, EPEA and other stakeholders. What is the difference to conventional products is the completely new production and manufacturing system. It has to be evaluated according to Cradle to Cradle® principles, in other words using only safe and positive substances, using renewable energy, planning how to return the products back either to nature as biological nutrient or to the manufacturing system as technical nutrient. The point is to eliminate the waste from the first place, which makes it a challenging process. The material for the Trigema Change® collection was organic cotton, harvested in Turkey, spun in Greece and then dyed, processed and made into garments in Germany. The products are highly scientifically researched and can be returned 100% safely to natural systems.

Fioen van Balgooi is the accredited consultant of Cradle to Cradle® design and drives for the eco-effective design solutions. She has done many different cases and is interested in seeking for new innovative design and printing techniques. Her work aims to help designers to design eco-effective fashion, which considers the whole aspect of social, economical and environmental area. She did for example the Fragmented Textiles collection in 2009 with Berber Soepboer of Cradle to Cradle® certified wool felt. They used the click and fold technique so that the garment need not to be sewn at all. Van Balgooi shares information through her company. As for the materials she advises to use mono-materials, which means for example cotton is not mixed with elastane or polyester. She says that the concept of Cradle to Cradle® is good because the products are non-toxic, easy to recycle and market and produce no waste.

The sports lifestyle brand PUMA launched their first C2C® collection called InCycle which carry the Recyclable InCycle Products Label. The company has ambitious goal about sustainability and want to be the leaders of it in sportswear worldwide. They have developed the Track jacket, the PUMA backpack and Basket sneakers to be fully recycled at the end of their lifecycle. It required a development of new materials and they choose the ones, for example the APINAT BIO® bioplastic for the soles in the shoes, which are suitable to use according to Cradle to Cradle design principles. The biodegradable products were made in a way that they do not include toxic chemicals and follow the international standards of composting. The Basket sneakers are biodegradable nutrient and made of organic cotton and linen with the APINAT BIO® bio plastic sole. The backpack is made of polypropylene and track jacket is made of recycled polyester. They are technical nutrients.

**Table 2.**

The role of the designer/design.

	Design aspects	Design values
Mona Ohlendorf for Trigema®	<p>Design good and intelligent products from the beginning not afterwards.</p> <p>High quality: The design process is extensive. The scientific process in the development of a C2C® garment includes that even the tiniest amount of substances has to be checked and optimized according to the C2C® concept.</p> <p>Have a bigger aim with a real change and innovation. Work together and share information to bring things forward with allied forces. (Ohlendorf 2012)</p>	<p><i>"I think every designer should be aware of, that 99% of the cloth they make are produced under horrible conditions for humans and the environment. That they are contaminated with toxic substances, that harm the human body and everyone and everything along the chain producing them." Mona Ohlendorf 2012</i></p> <p><i>∴we have the chance to step out of this destructive circle every second of every day too, just by adjusting the aim into new direction and start developing positive, intelligent products." Mona Ohlendorf 2012</i></p>
Fioen van Balgooi from REFINITY®	<p>Consider the effect of your (design) choice on the environment which is the ecological, economical and social/cultural environment.</p> <p>Design with a goal and with a reason. Design for a need.</p> <p>The different concepts for eco-effective design: Cradle to Cradle® design, emotionally durable design, Kaizen, design for real world, Biomimicry (Van Balgooi 2013)</p>	<p><i>"Think about the overall effects on people...and design with goal. Just making beautiful things is not enough." Fioen van Balgooi 2013</i></p> <p><i>"I work with the philosophy and I try to help designers on each level of eco-effectiveness because I think this new mindset goes step by step." Fioen van Balgooi 2013</i></p>
PUMA® SE	<p>Through Cradle-to- Cradle® design concept have better consumer quality, pose no health risk, deliver both economic and ecological benefits.</p> <p>Aim to have waste reduction through design.</p> <p>Long-term visions</p> <p>Innovative materials and design concepts (Seidel 2013 and InCycle Press Release 2012)</p>	<p><i>"We feel that we are responsible for the environmental impact our products cause and this innovative concept in sustainability is a first step towards our long-term vision of using innovative materials and design concepts for PUMA products that can be recycled in technical processes or composted in biological cycles." Franz Koch, former CEO of PUMA</i></p>

*Designer's role is about making choices*

*"I think every designer should be aware, that 99% of the cloth they make are produced under horrible conditions for humans and the environment."*

*(Ohlendorf 2012)*

As a summary to the question of what is the role of designer I wanted to look at the answers of each case concerning design. According to Ohlendorf, the best is to make good products in first place not afterwards. She describes that most of the clothes are made in horrible conditions. She advises to design intelligent and positive products. I like the point when she says that if there are other Cradle to Cradle® designers she regards them definitely as allies not enemies. She says that they are not many and in that case the cooperation is important. As I understood from Mona's information, the evaluation of Cradle to Cradle® garments is committed and really accurate and needs the designers choice and will to design without waste.

According to Fioen van Balgooi, the overall effect of design choices is the most important thing to think about. She says that the eco-effective fashion design fulfills the economic, ecologic and social aspects. She told me about different approaches that exists besides Cradle to Cradle® design. I get the picture of Fioen's interview that in designing you need to consider more than the outlook of the outfit. I think her point is to think with a broad mindset and that is why it is important to know about the other concepts too. She also considers that designers should design products that people really need. This is an eco-effective design decision on itself, to design for need and search for it. She means comfortable, emotionally durable, designed and practical garments. The ones people need in their daily life.

According to PUMA's design principles, they want to do better quality, reduce waste, promote consumer quality and design safe and healthy products. The conclusions I get out of PUMA's information is that innovations and higher aims in sustainable design promote results. They look for better quality in order that the product is really not "eco" but more comparable to conventional products. The C2C® products should have the same quality, or even better, without waste. The innovations are needed and they promote good results. I consider the Bring-Me-Back take-back system already an innovation.

What might come against every designer is the costs and time. The material made according to Cradle to Cradle® might seem expensive but in long run they use less the resources, are safe and can be totally recycled. Perhaps the question what needs to be asked is; what is really expensive, the health or the material? The development might be time taking but I think really interesting and economically rewarding. An important thing for designers today in the fashion world would be to consider all effects of the design choices. With broad mindset it is possible to think about the effects of design choices in a long run.

# CHAPTER 6.

# ANALYSIS RESULT

In this chapter I tell about the results that I found to my research questions. I analyse the results and think of guidelines as an answer for eco-effective fashion theory.

## 6.1. Answering to the questions

### *General guidelines*

The concept itself rely on main five principles of using only renewable energy resources, maintaining the water clean as a human right, making the materials healthy and safe for nature and people, being socially fair and reusing materials in biological and technical cycles and that way eliminating the concept of waste. (MBDC LLC 2012, Overview Version 3.0., 3-4 & The Cradle to Cradle Innovation Institute, 2011) The product becomes a C2C® product only when it has been certified and labelled by the Cradle to Cradle Innovation Institute. The point is to have the possibility to design the same products as earlier but in a safe way, like Jenny said in her interview. (Pfau 2012)

### *Conclusion of the results*

In the introduction I posed the questions how to implement the Cradle to Cradle® concept into fashion design. It has to be evaluated according to Cradle to Cradle® principles, in other words, using only safe and positive substances, using renewable energy, planning how to return the products back either to nature as biological nutrient or to the manufacturing system as technical nutrient.

The results imply that it requires committed changes in manufacture and production processes of the product/garment where every tiniest substance is researched according to C2C® principles. It requires cooperation with the C2C® concept companies such as the EPEA GmbH and the Cradle to Cradle Products Innovation Institute. It requires commitment of the supply tune and other stakeholders all along to the end consumer. It needs the attitude to concentrate not only to the present life of the product but also to the facts of what happens after its first life cycle. It requires a broad mindset to look at. The materials on the concept contain no toxic and harmful ingredients and for example the biodegradable products are made of organic materials (*fibers*) and biodegradable dyes and finishing agents. Basically all the yarns in the seams have to be made of the same ingredients as the main material itself. The material has to follow the laws of composting as well. The technical nutrients, such as the PUMA Track jackets from InCycle collection, have to be taken back to the manufacturer for reprocessing. It is important that a garment is made out of one material, not mixed with others. It guarantees more easily the life cycle thinking without waste.

*Cradle to Cradle® is not an ecological concept. It's a concept about quality. So it's more.*

*(Pfau 2012)*

Jenny Pfau said to me in the interview that Cradle to Cradle® presents quality. (Pfau 2012) Instead of being one ecological certification it is more. What the concept means in fashion industry is that the designers are cooperating usually with the EPEA GmbH, working together as allies, in the companies they develop and search for new materials and create contacts they need. The designers and the companies can make a difference through using the concept.

Fashion and clothes being an important part of our lives they also reflect our emotions and our identity. This sets the aim to design emotionally durable clothing, which satisfies the requirements and desires that the consumers have. Eco-effective fashion covers the ecological, economical and social benefits according to the triple top line principles of Cradle to Cradle® concept. The emotional design means that you consider the feelings that the customer has wearing clothes. I think these thoughts connect with the aims to design long lasting products and can be included in the design process as well.

Cradle to Cradle® requires committed changes in manufacturing and design processes in the fashion industry. Some companies have developed their own new innovative textiles and some, basically the independent designers use the existing materials of the market. The new materials are still needed in the realm of this concept in order it to be more common and well known, I mean to have all the range of materials available as C2C® certified that are used in fashion.

I think that the take-back systems are becoming more common in the clothing stores. Though good and eco-effective take-back systems are still under development since it is not that easy to make it cover all the aspects of eco effectivity. The products should not be transported too far away which is one problem. The long transportations negate the positive sides that an up-cyclable product might have, like Ohlendorf said. (Ohlendorf 2012)

The barriers for the growth of the concept are the limited technology possibilities for making the new products and the effective recycling system to guarantee the cycles to run. Moreover, the recycling has to be close in order it to be sustainable enough. The need for new materials is big. What it would require would be to have more textile companies making them and taking brave steps to

change their manufacturing to eco-effective ways. The materials are at the moment few but I think under development. In addition to the technology and the costs I think one barrier is the business of life in the work because it limits to focus on innovative new solutions. Eco-effective design requires development, commitment, time and money and barriers if a company is not ready for the development. The good sides are that the products are truly researched and made in a safe way, produce no waste and are economically and environmentally beneficial.

The concept has been working for few decades and all the time it has been growing. Perhaps the luxury fashion of future relies on circular fashion, which is safe and made of quality materials. The today's mass-production is a huge challenge because most of the mass-produced clothes are produced with low quality and in bad working conditions. The most important thing is to have broad mindset and be open to changes in all levels of the product design.

## 6.2. The role of the designer

The other main question was that what is the fashion designer's professional, economic, social and environmental role. I dealt with this issue along the whole study. The point that a designer is not a genius who came from fashion-ological theory. The thought that everybody is a designer came up in my interview with Pfau. So the Cradle to Cradle® concept looks at a really broad view on designing and on who the designer is.

In other words a designer can be just anyone. Moreover, he is responsible of his own actions as well whether you are a consumer or a designer. The separating fact of a designer from a standard citizen as a professional person is the passion of creativity to create new things. In fashion business world I understand that this means that the professional designer is not "above" everybody else but he is part of the group making new things. He is the creative director and works with the network with others. He can do his part and just be part of the group. He does not have to be perfect in everything but to use the network around him.

When it comes to the role of the designer, it is a responsible role, which requires making ethical decisions to people and nature. A designer is in a very important position on making decisions on how to produce the product, of which material and what is the overall effect of the whole product

lifecycle now and in the long run. Ohlendorf said that almost all of the garments are produced in terrible conditions and that should be considered in design. She advises to look for new directions. (Ohlendorf 2012) According to van Balgooi, she implies to do more than just beautiful things. She advises to consider the effects on environment (*people, nature, culture*). (van Balgooi 2013) As I analyze PUMA, they appreciate innovative solutions to reduce textile waste in their design and look towards long term big sustainable visions. (PUMA 2013) The responsibility of the designer is wide. Most of all, through this concept the more holistic view to look at is the start. The material safety, full material recyclability in an intelligent way and economical benefits are in a strong position.

### 6.3. Analyzing the results

People are after valuable and meaningful things, they want stories behind the products more than huge amounts of stuff. By stories, I mean how the product is really made and where does the materials come from. It is important to support common garments that people really need. The practical and stylish clothes people really want and like to wear in their daily life. The message behind is to do good design with pure and qualified materials in the first place. Due to the intelligent product manufacturing and up-cycling the paradigm of fashion design changes. The new luxury fashion is quality recycling. Only the well recycled and those, which can be returned back to the system again in a safe way is luxury. What I really like is that in addition it saves the resources.

The weaknesses that exist are usually the lack of knowledge and information of these concepts. In my experience people rarely know about this concept. The InCycle collection from PUMA was just recently launched so it takes many years for the products to come back again. We will see the true results of the take-back system in coming years. Hopefully the recycling technology would be possible to have close to many places, not only Asia. Either the long transport ways negate the positive sides.

As a hypothesis I thought of the sentence that how Cradle to Cradle® is beyond sustainability. This was not easy firstly to see because the sustainability as a word is everywhere. I think it depends on what is actually meant by sustainability since it is used in so many contexts. However, I really think that Cradle to Cradle® gives a really holistic view on designing and looks and is as a concept beyond sustainability.

# CHAPTER 7.

# CONCLUSION

This is the conclusion for my study. I go through what was my purpose in my work and what kind of answers I found. I think about the validity of my research through the trustworthiness, research ethics and novelty value of it. I also consider how this study could be generalized and studied further.

### *Aims of the research*

As I started my study I had had the interest to this concept already a while. I knew something about it beforehand. My purpose was to find out how the concept can be implemented to fashion practically and what is the role of a designer in it. My purpose was to know about the context more of myself and also add knowledge about it to others.

The theories were based on fashionology (Kawamura 2005), looking at the phenomenon as a sociological change in an immaterial climate of fashion, and Cradle to Cradle® concept principles. My aim was to see what a paradigm change in fashion design looks like from the view of Cradle to Cradle® design.

### *Ethics, reliability, generalization and novelty value of the research*

My aim was to be loyal to the information content I got revealing it clearly and objectively. I could have been better at informing the informants about my work as it progressed. Overall, my aim has been to keep the precise academic research ethics, transparency and validity in my research both in the references and in my written text.

I used the content analysis to categorize the information. None of the research guidebooks actually really told how the research method should be used so I used it in my own way. I think the content analysis was suitable for this research because it made me see the most important things. The groups I made from the data were dealing mostly with the same topics case by case, which was partly because the research questions were the same to each case. It also proved that the concept requires dealing with these issues, such as thinking of the product recycling (*upcycling*) and the ingredients in the product. What I think was a limitation in my work was the lack of really close information. I hope I could have had some observed information or perhaps even face to face interviews to analyze.

I think that as a fashion study this provides new ways to look and think and challenges the ways of the common clothing design. It can be compared to other studies related to Cradle to Cradle® design in fashion. Also topics related to sustainable fashion. For me the subject was not easy and it took time to see what is the area I am in. One of the most important things, and also challenges, of my work came to truly understand what the concept is about and share right information about it. How well I did it I leave to the readers.

### *Answers to the questions, generalization and further studies*

As an answer to my research questions I found that the concept asks for committed changes in the whole design process. It considers changes in choosing the right material suppliers and production ways. It also requires to inform the end consumer about the characteristics of the product and to share right information.

Through this study I have got a deeper picture about how it has been used in fashion design. The practical part, making the C2C® optimized garment itself, would be really interesting to see. I mean the processes of the manufacturing for example. The next study could deal with the practical design process of a Cradle a Cradle® garment to the certification of it. It would be interesting to create new models of production and design. This actually what Gam and other researchers did (Gam et al. 2009) creating their C2CAD design model but perhaps to look at the production in another field of fashion. Other subjects could be that how the large mass-production companies could go C2C® or how the change could happen within the luxury brands. How the customers and people could be informed more effectively?

### *Conclusion*

The paradigm change in fashion industry consist of the changes in postmodern understanding of what is the true luxury: Cradle to Cradle® combined with the traditional luxury items, using mass-customization, understanding the designer's creative role and producing no textile waste at all. What the concept means in the fashion and textile industry is that designers cooperate with EPEA GmbH and other concept related corporations, they search for the right materials and have the right connections.

Through cases I had the results that the companies and designers want to make a positive difference through C2C® design, the concept requires committed changes in design and manufacturing processes. As circular lifecycle thinking it aims to cover all the aspects and there exists only recyclable products as a design goal. The new material innovations are needed and the companies need money and the right technology. The biggest barriers for the growth of the concept were the lack of materials and the information. In addition, for the system to work we would need a take-back system that covers all the aspects. When it comes to the role of the designer, it is a role with responsibility, which requires making ethical decisions for people and nature.

*“ - the genuine desire to help others, coupled with intellectual curiosity and a deep commitment to constant improvement.”*

*(McDonough & Braungart 2013, xvi)*

This is what the President Bill Clinton said about the work what Bill and Michael do through their concept. The concept gives all the possibilities to work on every area of fashion design and produce safer and positive garments without waste in the first place not afterwards. I think that the clothes that run in cycles are yet to come and the future fashion forms in the values of safety, transparency, material reutilization and holistic quality and aesthetics.

The concept relies on thinking of design as an enjoyment, which provides joy. The aim of it is to keep a broad mindset and to make the same products as previously but in an eco-effective way. Upcycle means that the product is made of the best and the most pure ingredients to the environment and to the lives of people. As said in the beginning McDonough and Braungart want to design for a world of:

*The goal of the upcycle is a delightfully diverse, safe, healthy, and just world with clean air, water, soil and power - economically, equitably, ecologically, and elegantly enjoyed.*

*(McDonough & Braungart 2013, 12)*

As in the challenges of the design world I think Cradle to Cradle® can make a difference. Fashion brings pleasure and is part of our identity. The problem is how to satisfy the needs of the customers now and in the future. In my opinion we need the attitude and view of circular design. Cradle to Cradle® makes sense to design really quality fashion. It is about commitment for constant improvement.

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**Figure 1.** Trigema®, Trigema Change® collection. Inc. 15.7.2013.

**Figure 2.** Fragmented Textiles collection, 2009.

A collaboration between Refinity and Berber Soepboer.

Photographer: Savale

Model: Marjolein Heij

Make-Up / Hair: Annelies van Oosterum (*with the permission of the Refinity®*) Inc. 23 May 2013.

**Figure 3.** Barthez Yves, 2013. “Devenir invisible par nature” (Become invisible in nature)

PUMA INCYCLE - Collection recyclable and biodegradable.

(hd\_afa9ccd73099a0a993d699d46a6871cb.jpg)

Inc.18 January 2013. (incorporated with the permission of the creator)

<<http://www.behance.net/gallery/PUMA-INCYCLE-Collection-recyclable-et-biodgradable/6734691>>

**Figure 4.** The research context. By the author (2013).

**Figure 5.** EPEA Internationale Umweltforschung GmbH, Cradle to Cradle® logo. <<http://www.epea.com/en/content/cradle-cradle®>> Inc.1.6.2013.

**Table 2.** The role of the designer/design. By the author (2013).

**Table 1.** The implementation of Cradle to Cradle® concept to fashion design. By the author (2013).

### *Appendices*

1. Appendix The research questions.
2. Appendix The categories.

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# Appendix 1. The research question

*INTERVIEW (for Ohlendorf, van Balgooi, D. Seidel)  
Cradle to Cradle® concept in Fashion design.*

## *Introduction.*

1. Could you shortly tell about yourself - what do you do and what is the vision behind your work?
2. Why do you prefer to use Cradle to Cradle® concept in the design of your products?

## *Source and Make.*

3. How did your Cradle to Cradle® collection/garments come to be?
4. What practical changes you had to make in your design and processes to make Cradle to Cradle® collection/garment 100% recyclable?
5. Which are the characteristics of a Cradle to Cradle® collection/garments?
6. Which are the biggest challenges to make Cradle to Cradle® products at the moment?
7. Which are the strengths/weaknesses in making Cradle to Cradle® clothes?
8. Where do you produce your garments and why?

## *Use & Last.*

9. They say that on average 75% of the ecological footprint comes from the use of the garment. Have you tried to minimize the use of energy / water to be used during the use of the clothes? (*washing, drying*)
10. How can the clothes be recycled at the end of their use?
11. How is the closed-loop system organized after the use of the clothes?
12. Which are the tools you use to inform sustainability to your customers? /How do you educate customers?

## *Future.*

13. The Cradle to Cradle® design is a small but growing segment in the market today, which are the barriers to the development and conditions for growth?
14. Which are your future plans/hopes concerning Cradle to Cradle® design?

## *INTERVIEW*

Jenny Pfau. Geoecologist, Building Biologist IBN, EPEA GmbH.

### *a.) Introduction about EPEA.*

- Tell about your work in EPEA. What is your main working area?
- How long have you been working in EPEA?
- What is your company's mission?
- Breakthroughs this far, could you tell a little bit the most important steps that has happened in EPEA concerning cradle to cradle design?
- The countries in you're mainly working with?
- You train companies with the aim of implementing C2C.
  - How much does it cost for a designer to get your training and a certificate to a product?
  - What does the training include?
- You improve the quality of constituent parts.
  - How it goes with the materials, products, water,air and energy?

### *b.) Design Principles*

- What is in your opinion about the designer's role in sustainable design?
- What are the main things that separate cradle-to cradle design from other ecological concepts? (or certificates)
- Core values in cradle to cradle design? strengths/weaknesses in C2C design?
- The advantages you could name for a designer right away in C2C design?

### *c.) C2C in Clothing Design*

- How many clothing/textile companies have been doing cooperation with you?
- Could you name the most important ones?
- As a designer, it's good to have goals. If you want your company to design more eco-effective products, what would be the first three milestones to start with?
  - Which textile companies you would recommend to work with?
  - Which textiles would you recommend to use in clothes?

### *d.) Future*

- What are EPEA's future visions concerning Cradle-to Cradle design?
- What would be your own visions about coming trends on this field of study?
- Which are the challenges you face right now concerning the future in your company?
- What is a good advice you would like to say to a designer?
- (What every designer should know?)

## Appendix 2. The categories

### *Trigema Change®.*

*Interview: Mona Ohlendorf, Fashion designer. Former Managing director/ creative director of Trigema Change®.*

#### **1. THE COMPANY OF TRIGEMA®:**

“There are no comparable guidelines or case studies we can follow in that field.” -TRIGEMA®

- steady control in production
- SOCIAL RESPONSIBILITY
- THE ENVIRONMENT
- TRANSPARENCY

#### **2. CRADLE TO CRADLE: two cycles**

“Every single substance is checked and designed according to C2C concept.” Ohlendorf, 2012

EVERY SINGLE SUBSTANCE IS CHECKED AND DESIGNED ACCORDING TO C2C CONCEPT.

BIOLOGICAL NUTRIENT CYCLE/TECHNICAL NUTRIENT CYCLE

GOOD SIDES/CHALLENGES

C2C FABRICS, BUTTONS ect

#### **3. MANUFACTURING PROCESS non-toxic**

“One single color contains a great number of pigments and substances which, in turn, contain a multitude of ingredients. This is what makes Cradle-to-Cradle® optimization an extensive and highly scientific process. We have successfully completed this optimization process after two years of cooperative research in cooperation with the EPEA Institute for ongoing evaluation of raw materials.” (Ohlendorf 2012)

- PRODUCTION: local, whole supply chain as own, transparency, controlled PROFESSIONALS
- COOPERATION: in cooperation with EPEA
- MARKETS: 2006 first garments to market, 2010 new line Trigema Change

#### **4. THE RECYCLABLE PRODUCTS**

“How to make it positive and useful for recycling and environment?” (Ohlendorf 2012)

#### **5. MATERIALS**

“We filtered all substances out of the dyes that have been categorized as “risky” in accordance with a human ecotoxicological risk evaluation and replaced them with substances that are defined as positive.” (Ohlendorf 2012)

## **6. THE ENERGY**

### **7. TAKE BACK SYSTEM**

*“What is mainly missing for all that by now, is a intelligent and customer-comfortable take-back system and it appears to be very uneasy to figure out such system, that accounts all aspects and still is economical and ecological effective.” (Ohlendorf 2012)*

### **8. DEVELOPMENT**

*“Our products contain the following attributes: They are recyclable; utilize resources instead of consuming them; they are 100 per cent composed of wholesome, non-critical substances and of particularly high quality.” (Ohlendorf 2012)*

- FIRST TIME MAKING SUCH A GARMENT
- ECO INNOVATIONS

### **9. MARKETING**

*“Our customers mainly value the quality and the moral standing of Trigema.” (Ohlendorf 2012)*

### **10. PROBLEMS SEEN IN MARKET:**

*“The development in eco-alternative products, materials and production-ways is kind of slow, because the big players that have the money and the impact to support development don't care for it.” (Ohlendorf 2012)*

### **11. BARRIERS OF GROWTH:**

*“Green fashion has to provide the same style, the same level of coolness and attractiveness as conventional fashion. Also the price must be kind of the same.” (Ohlendorf 2012)*

### **12. UPCYCLING**

*“This biological nutrient is again the base new plants can grow on. Here the cycle gets closed.” (Ohlendorf 2012)*

### **13. THE NEED FOR COMMON PRODUCTS**

### **14. FUTURE:**

*“The C2C concept is the most intelligent and most promessing way to generate products and ways of production, that are able to satisfy the needs of todays lifestyle, support the need of economic growth and are able to support live, health and the preservation of all kind of resources - now and in the long run.” (Ohlendorf 2012)*

- POLITICAL SUPPORT
- CONSUMER PRESSURE:

### **15. DESIGNERS ROLE**

*“I think every designer should be aware of, that 99% of the cloth they make are produced under horrible conditions for humans and the environment.” (Ohlendorf 2012)*

- The problems are not unchangeable.
- *The unintelligent products are made under unintelligent processes and destroys everybody elses future every second. We have also a chance to step for new direction every second too - start to develop good and intelligent products.*  
(Ohlendorf 2012)

- “You will find some designers and students in the internet that mean to work according to c2c - as well as you’ll find lots of products. I know from EPEA, that there is nearly none of them really doing C2C.” (Ohlendorf 2012)
  - Half of them do not know what it truly means.
  - The other half do not have the possibility to work according to it because so few suppliers.
  - DESIGN
  - AESTHETICS
  - VALUES
  - THE ATTITUDE TOWARDS OTHERS IN THE MARKET:
    - WORK TOGETHER
    - DO IT TOGETHER
    - “A way of thinking as a team more than a competition is very uncommon in business.” (Ohlendorf)

**Interview: REFINITY®/ Fioen van Balgooi**

*(a consultant of eco-effective fashion design, an accredited C2C design consultant by EPEA)*

*“My goal is contributing to a marvelous diverse (fashion) world in which people make conscious decisions with respect for human and environment.” Fioen van Balgooi*

**REFINITY®**

- fashion designers to design eco-effective and to find solutions
- brainstorming, questions and solutions, network, database
- a research and advice company
- eco-effective ways of designing fashion

**1. IDENTITY AND FASHION**

*“If fashion only was about wearing clothes to protect you for the elements it was a lot easier, but fashion is also an important aspect of our identity” Fioen van Balgooi*

**2. CIRCULAR ECONOMY**

*“It is about a circular economy” Fioen van Balgooi*

- PRODUCTS RECYCLING
  - “This depends if they are in the biological or the technological cycle, or they can be composted, or they can be mechanically or chemically recycled. But I prefer first to give the clothes a second life and only compost or recycle them if they are falling apart.” (Fioen van Balgooi)
- TAKE BACK
- INFORMATION SHARING

### **3. LOOKING DIFFERENT CONCEPTS**

*“Cradle to cradle was for me the eye opener” (F. van Balgooi)*

- Cradle to Cradle
- emotionally durable design
- design for the real world
- Kaizen
- Biomimicry

### **4. ECO-EFFECTIVITY**

*“ I call it eco-effective as for me it covers the whole aspect” (Fioen van Balgooi)*

### **5. EMOTIONAL DESIGN**

*“How does someone feels himself wearing a garment” (Fioen van Balgooi)*

### **6. DESIGN ASPECTS**

*“ You can do so much with design to make it look different each time” (Fioen van Balgooi)*

- MONO MATERIALS
- PRINTING AND DECORATION
- THE TECHNIQUES
- GOOD SIDES/ CHALLENGES of C2C

### **7. REFINITY® IS WORKING WITH ECO-EFFECTIVENESS AND C2C**

*“Therefore I do not limit my designs to cradle to cradle but I choose the best aspects of each concept. And I call it eco-effective as for me it covers the whole aspect.” (Fioen van Balgooi)*

### **8. VISION FOR FUTURE**

*“We do not have to call it cradle to cradle design anymore in the future, but that it is a common way of working” (Fioen van Balgooi)*

### **9. DESIGNER’S ROLE**

*“Think about the overall effects on people...and design with goal. Just making beautiful things is not enough.” (F.van Balgooi)*

## **PUMA SE®,**

*(Stefan D. Seidel, Deputy Head in PUMA safe Global Team/ Team Head in PUMA safe Ecology)*

### **1. THE BRAND**

*“PUMA’s mission is to become the most desirable and most sustainable Sportslifestyle company in the world.” Franz Koch, former CEO of PUMA*

- multinational sportswear
- founded in 1948

- responsible of the environmental effects that their products cause
- aim to reduce footprint of their products
- majority of the supply chain in Asia

### *1.1. The concept of PUMA InCycle*

*“InCycle collection is the first step to reduce the amount of garbage that consumer products cause at the end of their lives” Franz Koch, former CEO of PUMA*

- sustainable Footwear, Apparel and Accessories

### *2. DESIGN:*

*“We feel that we are responsible for the environmental impact our products cause and this innovative concept in sustainability is a first step towards our long-term vision of using innovative materials and design concepts for PUMA products that can be recycled in technical processes or composted in biological cycles.” Franz Koch, former CEO of PUMA*

### *3. Changes in design*

*“The most important change was the use of solely or fully recyclable / biodegradable materials” (Stefan D. Seidel 2013)*

- use solely or fully recyclable materials
- use biodegradable materials
- avoid composite materials and prefer individual material components

### *4. The products (Recyclable InCycle Products Label)*

*Recycling means that used materials instead of disposal to landfills will be processed into new materials. (Stefan D. Seidel 2013)*

- The PUMA Track Jacket (recyclable)
- The PUMA Backpack (recyclable)
- sneaker “Basket” (biodegradable)

#### **MATERIALS:**

- Jacket: 98% made of recycled polyester (used PET bottles)
- Backpack: the recycled polypropylene
- Sneaker: a mix of organic cotton and linen, sole biodegradable plastic APINATbio©
- the homogeneity of materials

#### **ATTACHMENTS:**

- recyclable zipper was made of recycled polyester as well

#### **RECYCLING:**

- return by the PUMA’s Bring Me Back program

#### **LIMITATIONS:**

- requires that the consumer understands the concept
- depends on individual behaviour

### **5. Biodegradable Products**

*All products of the PUMA InCycle collection are Cradle-to-Cradle Basic certifiedCM, being the first collection of footwear, apparel and accessories to carry this certification.*

*(Stefan D. Seidel 2013)*

- they must be only made of biodegradable materials
- organic fibers without any toxic chemicals
- have to follow international standards for composting
- the sourcing and manufacturing process must be as low impact as possible
- European and American standards for biodegradable products. it has to degrade 90% within 6 months.
- new material innovations

### **6. THE AIM OF THE CRADLE TO CRADLE DESIGN:**

*“The aim of the Cradle-to-Cradle® design concept is to have an proved consumer quality for the user, pose no health risk for anyone who comes into contact with them and deliver both economic and ecological benefits.”*

*Kerstin Neuber, Corporate Communications - PUMA SE*

### **7. GOOD SIDES and LIMITATIONS IN CRADLE TO CRADLE DESIGN:**

*“The biggest challenges are material limitations and limitations in recycling technology for our products.” (Stefan D. Seidel 2013)*

### **8. USE PHASE**

*“..a significant portion of the environmental impact can be attributed to the consumer usage phase...” (Stefan D. Seidel 2013)*

### **9. THE BRING-ME-BACK PROGRAM:**

*“Their line of sports and lifestyle products are truly designed based on the Cradle to Cradle® design principles. Their new collection, along with their cooperation with I:CO and their Bring Me Back system, put them at the forefront of holistic beauty, innovation, and quality.”*

*(Prof. Dr. Michael Braungart, EPEA.)*

- Bring Me Back Websites: <http://de.puma.com/bringmeback>

### **10. MARKETING:**

information sharing: through websites (<http://about.puma.com/sustainability/>), the Bring Me Back Website, the PUMA S-Index, product labeling and separate InCycle labeling, in-store marketing materials as well as through media coverage

### **11. FUTURE:**

*We wish for a positive sales volume so the market for Crade-to-Cradle products can grow and expand in the future. (D.Seidel 2013)*