C2C

NETWORK

PERSPECTIVE STUDY: INDUSTRY

European Union
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INTERREG IVC
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Colophon

This perspective study will serve as frame of reference for follow-up activities and exchanges both within and outside the Cradle to Cradle Network (C2CN) and it aims to reflect the current challenges and opportunities associated with implementing a Cradle to Cradle approach. In total, four perspective studies have been written, in the areas on industry, area spatial development, governance and on the building theme.

These studies are not formal academic literature reviews, but are written from a practical point of view and offer some general understanding and guidelines for those engaged in C2C initiatives, as well as policy-makers. They aim to consider 'on the ground' delivery of the C2C philosophy and reflect on both theory and practice. While the perspective studies focus on applications in one thematic area, a separate document – Theoretical Framework – provides more detailed information on the principles of the Cradle to Cradle concept and its implications at a theoretical level. The framework helps to develop a common language for the Network and underpins the perspective studies and the ongoing work of the C2CN.

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Under the Authority of Milano Metropoli Development Agency and supervised by Gianluca Sala and Daniela Vergani

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1 Introduction

1.1 Cradle to Cradle Network

The Cradle to Cradle or C2C Network is a capitalisation network (Interreg IVC) which aims to reduce the utilisation of raw materials and to generate less waste and less environmental pollution as well as enhancing innovation and economic development. The C2C Network brings together 10 EU regions to share and capitalise on regional good practices in implementing Cradle to Cradle principles.

The overall objective of the C2C Network is to develop regional action plans, reflecting the principles of the Cradle to Cradle concept, systematising its regional interpretations and setting out how the good practices critically assessed by the network will be implemented within regional mainstream structural funds programmes.

Within the overall more strategic objective the Cradle to Cradle Network project aims on the short term at the following operational goals:

- To create an enduring network of regions related to Cradle to Cradle;
- To promote regional stakeholder involvement;
- To disseminate and communicate to a wider EU audience outside the partnership (awareness raising) and to the European Commission (policy recommendations) approved methods for waste prevention/reduction based on the Cradle to Cradle philosophy.

The ambition of the C2C Network project is to help people understand what the implementation of Cradle to Cradle for the target areas industrial design (materials, products, production processes), buildings (design, materials, construction), area spatial development and governance could look like and to disseminate and learn from good practices. It is not the objective to use or develop a criteria-based evaluation tool that states which applications are Cradle to Cradle and which are not. A theoretical Cradle to Cradle framework has been developed for a common language within the network and provides more detailed information on the Cradle to Cradle concept, its principles and its implication at a theoretical level[1]. This framework may form the basis of the regional action plans to be developed.

1.2 Perspective study industry

The aim of this perspective study is to provide insights into the state of the art as well as future developments in industry from the Cradle to Cradle point of view. This perspective study will serve as frame of reference for follow-up activities and exchanges both within and outside the C2C Network. This study will not be a formal academic literature review but is written from a practical point of view. This report will offer some general learning and guidelines for those engaged in C2C initiatives as well as for policy makers. It aims to bridge the gap between the Cradle to Cradle concept and C2C inspired practices.

The study has been delivered by Milano Metropoli Development Agency, the Italian partner in the Cradle to Cradle Network project, through the Design and system Innovation for Sustainability (DIS) research unit of Politecnico di Milano – INDACO department (Italy), with the collaboration of other experts.

The second chapter of this perspective study summarises the theoretical framework, starting from the definition of sustainable development and showing how industry's approach to environmental sustainability has changed little by little. This perspective study then goes on to show how the Cradle to Cradle approach embraced this evolution, illustrating this with a number of cases collected by the partners of the Cradle to Cradle Network across Europe, along with a selection of examples from over the last few years from the databases used by the DIS unit of Politecnico di Milano.

All these good practices are intended as inspiration and ideas from which to develop successful business models, making the Cradle to Cradle approach environmentally, socially and economically interesting. In the last chapter lessons learned will be described. In the Appendix interviews with good practice owners are reported in order to give the protagonists of the day-to-day Cradle to Cradle application a voice. In addition opinions of sustainability experts are presented to add further stimuli to the discussion.

1 Stouthuysen, P., Le Roy, D. (2010). Cradle to Cradle Theoretical Framework, commissioned by the Cradle to Cradle Network

Important contributions to the elaboration of this study and the shape of the discussions came from:

- the work of VITO and Sustenuto that provided the theoretical framework for the report (sections 2.1, 2.3, 2.4 and chapter 3);
- a regional workshop organised by Milano Metropoli on 4th April 2010, where the C2CN project and the C2C principles were presented and discussed with representatives of companies from different sectors, local public authorities and non-profit organisations working with environmental sustainability;
- the dialogue that each partner of the Cradle to Cradle Network project had with the good practice owners during the collection of good practices;
- the four thematic seminars of the Cradle to Cradle Network, each one tackling one of the thematic areas defined for the project (i.e. building, governance, area development and industry), particularly the international expert seminar 'C2C for industry', held on 9th and 10th September 2010 in Archivio Giovanni Sacchi in Sesto San Giovanni (province of Milan, Italy);
- the contribution of Dalia Gallico that provided the report with useful examples to present the meaning of the Cradle to Cradle approach in practice and with some of the contents presented in the Appendix (see detailed references in the text).

2 A theoretical framework for the C2C Network

2.1 Objectives

The main objective of setting up a theoretical Cradle to Cradle framework is to develop a common language for the Network. This framework will help the members of the Network in the selection of good practices but may also form the basis of the regional action plans to be developed. It is not the intention that the framework has to include a list of elimination criteria but it will build upon the conceptual characteristics to come to eco-effective solutions (beneficial for man and the environment) and is not – in this context – an evaluation tool such as the Cradle to Cradle certification system.

The theoretical framework focuses on the general description of Cradle to Cradle. It presents Cradle to Cradle in general. Complementary work will explain Cradle to Cradle further with a focus on four individual target areas: industry, building design, spatial area development and governance. One general theoretical framework is proposed which will be of use for all target areas. Each target area needs an explanation to position it in the wider theoretical framework. The aim of this project is to collect the relevant (existing) information. No new research has been conducted. Questions which will be answered are, for instance:

- How do we define Cradle to Cradle within our network?
- What is Cradle to Cradle in concept, its principles and applications?

Cradle to Cradle is not a waste management concept, but a radical innovation in a business context that aspires to get rid of all negative environmental impacts associated with human activities, including waste.

2.2 Evolution of environmental sustainability in the industry sector

Historically, since the environmental issue was raised during the second half of the twentieth century, the approach to environmental sustainability has moved from an end-of-pipe approach to action increasingly aimed at prevention.

The need for a profound transformation of the development concept for a system of discontinuity appeared clear and led political, scientific, philosophical and social debate to question not only production processes but artefacts in general, their design and development: products and services, systems and all the various forms of human settlement. As well as patterns of consumption, access to goods and services were then discussed, in the perspective of structural innovation, including issues of social equity and cohesion.
In the following text, the evolution of the design and industry approach to sustainability is outlined.

Sustainable development

In 1987 the World Commission for Environment and Development (WCED) prepared a document entitled ‘Our Common Future’, also known as Brundtland Report after the coordinator of the commission, Gro Harlem Brundtland. It was the first occasion when the concept of sustainable development was introduced. It defined sustainable development as follows: ‘Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs’ (WCED, 1987). This definition does not mention the environment per se, but refers to the well-being of people as environmental quality. From here a fundamental ethical principle originates: the responsibility of present generations to future generations. As a result of this document, various other significant international initiatives were started, including the United Nations Conference on Environment and Development held in Rio de Janeiro in 1992, and the World Summit on Sustainable Development that took place in Johannesburg ten years later.

2.2.1 Selection of resources with low environmental impact

A first level on which numerous companies and designers, as well as theorists and academics, have worked is the selection of resources with low environmental impact: on one side the materials and on the other the energy sources. The main topics have been the elimination of toxic substances, recyclability, biodegradability and renewable resources (Table 1).

Table 1

Toxicity	The ability to cause harmful effects on living beings, characteristic of a toxic agent when a certain level of concentration is exceeded, is called toxicity, a criterion to be referred to in all stages of the life cycle of a product. The increased importance of this topic immediately led to a series of regulations, continuously under redefinition and upgrading, requiring designers and industries to add updated knowledge of these rules to their competences.
Recyclability	Treating recycling properly demands transition from estimating the recyclability of materials to the economic and technological feasibility of the whole process. Thus design choices have to focus on the morphology and architecture of the product and design correlated to the entire path of the recyclable material. Thus design for recycling has to cover a set of indications which aim to facilitate every single stage: collection, transportation, disassembly and eventually cleaning, identification and production of secondary (recycled) raw materials.
Biodegradability	Biodegradability is a characteristic of organic substances and of some man-made compounds that are decomposed by nature or by saprophytic bacteria. If this biological process is complete, the result is a total conversion of the initial organic substances into simple inorganic molecules such as water, carbon dioxide and methane. Environments where biodegradation happens more quickly and that can be industrially managed are those of composting and anaerobic digestion.
Renewability	Renewability is related to both the specific speed of recovery of the resource (material or energy) and to frequency of use. More precisely, a resource is renewable only when it is replenished by natural processes at a rate comparable to its rate of consumption by humans.

2.2.2 Product Life Cycle Design (LCD)

Since the second half of the Nineties, attention has partially moved to the product level, i.e. to the design of products with low environmental impact. In those years it became clear which are the environmental effects attributable to a product and how to assess them; the concept of life cycle was introduced and the concept of functional unit was recontextualised in environmental terms. The criterion that underpins this design approach (included in its very definition) is that the design has to adopt a systemic approach: from raw material extraction necessary for the production of the finished materials to the final disposal of these same materials when the product reaches its end of life. The importance of a life cycle approach is to allow environmental and economic benefits to be identified and put in some relation. From the first design stages it is actually more efficient and economically profitable to adopt solutions for the recovery and the remedy of potential damage instead of applying end-of-pipe solutions.

2.2.3 System design

Over the last few years, with a more stringent interpretation of environmental sustainability (that requires systemic discontinuity in production and consumption patterns), part of the debate has refocused on design for sustainability starting from system innovation. Some authors (e.g. UNEP 2002[2], Goedkoop et al. 1999[3], Mont 2002[4]) have observed that the criteria for product Life Cycle Design meet obstacles in traditional supply models of product sale; it is therefore necessary to broaden the criteria to increase the probability of product innovation. This means focusing not only on product innovation but orientating innovation towards systems of products and services that together are able to satisfy a particular demand, thanks also to innovative interaction, collaboration and partnership of the socio-economic actors involved in the system.

2.2.4 Design for social equity and cohesion

Still more recently, the industry sector included in its agenda the themes of social equity and cohesion, starting from the aspect of availability and fair distribution of resources, respecting cultural differences, regional identities and natural biodiversity. At the root of the issue the question is: how can the reduction of consumption of resources per 'unit of satisfaction' lead to their fair redistribution at local and global level?

2 UNEP (United Nations Environment Programme) (2002). Product Service Systems and Sustainability. Opportunities for sustainable solutions, Paris: UNEP.

3 Goedkoop, M., van Halen, C., te Riele, H., Rommes, P. (1999). Product Services Systems, Ecological and Economic Basics, report 1999/36. The Hague: VROM.

4 Mont, O., 2002. Clarifying the concept of product-service system. Journal of Cleaner Production, 10(3): 237–245.

2.2.5 Conclusion

Aiming at designing and producing in compliance with environmental sustainability means to promote the ability of the production system to face the social demand for wellbeing using resources in a drastically different way from what is done today, shifting the focus from the products to the satisfaction and the increase in the quality of life that they can offer, taking into consideration the context in which they are used and the relative metabolisms. This calls for coordination in the management of all the available tools (products, services and communication) and for giving unity and visibility to new, promising proposals.

The focus is then on (product and service) system innovations, strategic innovations where the centre of the business shifts from the design and sale of physical products to the offer of an integrated set of products and services able to satisfy a specific demand. In this line, the economic interest, for the ones who 'produce' and supply the offer, is not anymore linked to the quantity of products sold (as in the traditional production and consumption system), but to the quality and efficiency with which a demand for wellbeing is satisfied.
All this promotes the optimisation of the life cycle of the product, the extension of the lifespan of materials and the minimisation of the resources used during the whole life cycle of a product, while offering the users high-quality answers to their needs.

Moreover, when speaking about sustainable development, we should also take into consideration the socio-ethical dimension, the implications of which touch different topics, such as the use and the specification of local resources, the assumption of responsibilities and the involvement of customers in sustainable consumption and behaviour, fairness towards the different socio-economic actors (in relation to a particular offer of products and services), the strengthening of social cohesion, and the inclusion of marginalised and weak persons.

To integrate environmental requirements into product design, production, commercialisation, use and consumption means that an increased level of complexity has to be managed, as well as a huge quantity of data and relations with stakeholders from different backgrounds. It follows that a new generation of professionals and companies, with an interdisciplinary profile, should get the knowledge and tools to be able to work in different points of the system, and not only in product innovation and production.

The Cradle to Cradle approach has embraced the evolution in the approach to sustainability described and gone beyond it. Cradle to Cradle is a positive interpretation of the radical rethink of the present production and consumption systems, until now often perceived as a set of mortifying objectives. In the words of Prof. Dr. Michael Braungart (founder of the EPEA International Umweltforschung GmbH in Germany and co-author, with William McDonough of Cradle to Cradle - Remaking the Way We Make Things[5]): 'We focus on the triple top line – beneficial for the environment, lucrative for the economy and good for society'.

2.3 Perspective from efficiency to effectiveness

The Cradle to Cradle concept has been developed by William McDonough and Michael Braungart. The power of the Cradle to Cradle concept lies in its innovativeness and its ability to mobilise and inspire. The Cradle to Cradle approach is a positive one, starting with an initial intelligent design. It is also a concept that integrates, as it incorporates a design approach and system thinking. It covers supply chains (the recycling of natural resources, via product and manufacturing design, to high value re-use) and also involves systems as well as management. It envisages a challenging future and incites us to move to a complete new way of product design and innovation. Cradle to Cradle is innovative with very ambitious goals concerning continuous loops in production, and aims to integrate high standard principles in building and spatial design.

It promotes a shift from eco-efficiency towards eco-effectiveness. According to Verfaillie et al[6] eco-efficiency strategies focus on the reduction of environmental impacts made by human activity, without allowing the (socio-) economic value to drop (2000). Eco-efficiency thinking is actually a translation of the traditional efficiency thinking that has long been incorporated into Western economic thought. It is this way of thinking that McDonough and Braungart, the inventors of the Cradle to Cradle concept, are trying to tackle. According to them, eco-efficiency is a reactionary approach that stands in the way of a fundamental redesign of industrial material flows.

Eco-efficiency techniques lead to a reduction of the effects, without suggesting a real alternative to the linear 'cradle to grave' material flows. In this perspective, the majority of known recyclable materials are reused in lower applications (downcycling) because it is not possible to separate valuable materials at the end of their useful life span. Gradually these materials are dumped or they are incinerated with or without energy recovery.

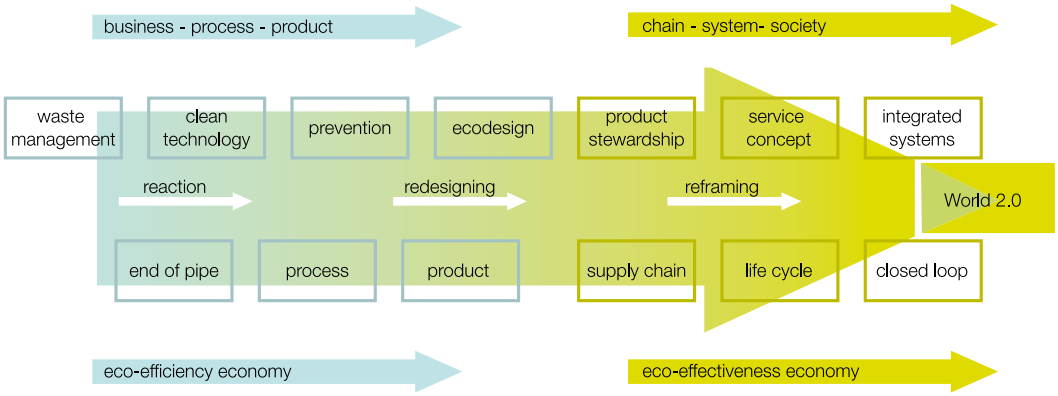
5 William McDonough and Michael Braungart: (2002). Cradle to Cradle: Remaking the Way We Make Things, North Point Press, New York, USA

6 Verfaillie H.A., Bidwell R., (2000). Measuring eco-efficiency a guide to company performance, World Business Council for Sustainable Development

A positive agenda plays a central role in the design and manufacture of products and services, in which the synergy between economic (business), ecological and social objectives will be strongly promoted. 'Our goal is a delightfully diverse, safe, healthy and just world, with clean air, water, soil and power – economically, equitably, ecologically and elegantly enjoyed.'[7] It is not about 'doing more with less' and reducing waste (cradle to grave) but about 'doing right from scratch'. It is logical that these transitions are not realised overnight. The development of a growth path to these newly set goals is needed and continuous improvement is thus an implicit requirement of engaging in Cradle to Cradle.

Eco-effectiveness provides a broad conceptual framework for effectively solving some social – and especially environmental – issues, such as the conservation of raw material quality, rather than reducing waste. Its highest ambition is known as zero waste, and its goal is the manufacture of fully healthy products, instead of reducing harmful substances (similar to zero emission). While eco-efficiency strategies promote less consumption (cf. consumption cutback) and the extension of the lifespan of products, eco-effective measures allow for an immoderate consumption and short life spans – provided that the quality of raw materials is guaranteed and that renewable energy feeds production and consumption. While one of the key elements is providing safe and healthy products, which involves a drastic substitution of toxic elements, toxic substances can be applied in transition when no alternatives are available, at least if these substances are not exposed to man or environment and remain in a closed material system[8]. In this way, Cradle to Cradle is the next step in the evolution towards an eco-effectiveness economy. Figure 1 describes the evolution of sustainable materials management approaches showing the shifts from reactionary to proactive approaches and from focus on business-process-product towards a focus on the integrated chain system and society interaction.

Figure 1: Sustainable materials management approaches: evolution from an efficiency to an effectiveness approach.[9]



Such high aspirations require among other things a different way of product development/design and intelligent handling of materials after use.

Despite the fact that Braungart and McDonough focus on the shortcomings of applying an eco-efficiency strategy, they recognise the fact that efficiency and effectiveness can be complementary strategies. The concept of efficiency on itself has no value: they state it can be either good or bad. For example, the slimming down of material flows per product or service unit (eco-efficiency) can only be beneficial in the long term if the goal of closing material flows (eco-effectiveness) has first been achieved. This means efficiency improvements are not necessary anymore from an environmental necessity perspective but are a matter of equity – they ensure the fair distribution of goods and services[10].

From a transition perspective eco-efficiency strategies will still be necessary to bridge the period for which eco-effective solutions are not yet available or 100% feasible. For example it is not yet 100% feasible to rely solely on renewable energy to meet our current energy demands[11].

Most of the eco-effective solutions suggested in the framework of Cradle to Cradle, such as the separation of biological and technical cycles, safe products, product service systems and the use of renewable energy were already known within the framework of eco-efficiency approaches. However, Cradle to Cradle places these solutions in a vision of where we want to go to instead of what we want to avoid and therefore places them in a positive agenda.

7 McDonough W., William McDonough on cradle to cradle design, presentation at TED2005 conference (2005), http://www.ted.com/talks/william_mcdonough_on_cradle_to_cradle_design.html

8 McDonough W., Braungart M., Anastas P., Zimmerman J. (2003), Cradle-to-Cradle Design and the Principles of Green Design – Toward New Perspectives and Practices for Engineering and Design, Environmental Science and Technology, December 2003.

9 A. Rossy, P.T. Jones, D. Geysen, K. Bienge (2010), Sustainable Materials Management for Europe, from efficiency to effectiveness, background paper for the informal Environmental Council on 12th & 13th July, 2010.

10 Braungart M., W. McDonough, and A. Bollinger. (2007). Cradle-to-cradle design: creating healthy emissions, a strategy for eco-effective product and system design, Journal of Cleaner Production 15, 1337 1348

11 More in David J.C. McKay (2007), Sustainable Energy – Without the hot air, UIT, Cambridge, United Kingdom

2.4 Cradle to Cradle: a framework for eco-effective solutions

When speaking about Cradle to Cradle, many express the idea of closing the material cycle, in order that materials are not lost to society but used and re-used again. Cradle to Cradle is, however, broader and consists of a conceptual framework, principles which underpin this framework and a wide set of applications, a part of which is certified by means of a certification system.

2.4.1 Concept: Cradle to Cradle framework

Cradle to Cradle as a framework is a new business model with the ambition of developing products which are safe, healthy and reusable. Since 1987 the Environmental Protection Encouragement Agency (EPEA), founded by Prof. Michael Braungart, has been working step by step on the development of the framework and the principles of Cradle to Cradle DesignTM[12]. The definition of materials and products and their optimisation by Cradle to Cradle creates a new dimension of product quality, based on materials that serve as nutrients for either biological or technical systems. The framework is developed in accordance with how nature has managed to evolve to a very diverse set of ecosystems and populations where waste is unknown.

The definition of very high ambitions is basic in developing Cradle to Cradle. It builds a vision of where regions and organisations want to be in the future. It sets beacons and directions for where innovation should lead to. It is a shift from eco-efficiency towards eco-effectiveness. It is not about 'doing more with less' and reducing waste (cradle to grave) but about 'doing right from scratch'. It is logical that these huge improvements are not made overnight. Developing a growth path to these newly set goals is necessary and continuous improvement is thus an implicit requirement of engaging in Cradle to Cradle.

Cradle to Cradle foresees the transition from the current industrial model, that 'takes, makes and pollutes', to a system with healthy and safe products whose materials stay in cycles. This new model will require a shift from ownership to 'usership' for products that are made of technical nutrients. These products are only used by consumers for the time needed and the product will then return into the remanufacturing chain. This demands a completely new kind of cooperation between suppliers, producers, customers, consumers and material managers. Intensive cooperation between these parties is needed to arrive at Cradle to Cradle products. Cradle to Cradle is in consequence a strategy for product and process innovation in which creation of continuous material loops is key. As technological materials are considered to be the means by which services are delivered, cooperation between producers becomes a new challenge as well. This leads to the creation of innovation platforms in and between sectors around material pools.

The Cradle to Cradle concept, however, does not only apply to products but also to urban and regional planning and architecture. Here 'doing right from scratch' means that from the design stage on the various functions of living, working, recreation, transport, nature and food production are fully integrated. The use of resources and renewable energy and water treatment is conceived from a life cycle perspective including production, use and recovery. The quality of the built environment has to ensure a safe, healthy and pleasant environment for its users. Making reference to how nature is managed, Cradle to Cradle stimulates us to design our buildings as trees and our cities as forests.

The Cradle to Cradle concept is not the only concept or philosophy about how we should rethink our products and processes from a sustainable development point of view. For instance, the concept of industrial ecology introduces the idea of an industrial ecosystem that would function as an analogue to biological ecosystems[13]. Materials should circulate in continuous loops and the waste of one process becomes the food for another process.

One of the main differentiating elements of Cradle to Cradle in relation to these other concepts is its level of ambition. Other strategies are generally embedded in the idea of eco-efficiency and therefore minimising the harmful impact of human activities. The ambition of Cradle to Cradle is to create completely safe and healthy products and to maximise the positive impact of human activities. Its attractiveness to business comes from its focus on adding value by enhancing quality. This makes Cradle to Cradle distinct from general interpretations in which sustainability and environmental aspects are seen rather from an efficiency or cost perspective.

2.4.2 Cradle to Cradle Principles

Together with the architect William McDonough, Michael Braungart has further developed the framework in the book 'Cradle to Cradle: Remaking the Way We Make Things' (2002). Here, they describe how not only new products, but also buildings, areas, etc should be designed in order to meet eco-effective objectives[14].

12 The term Cradle to Cradle is a registered trademark

13 Frosch, R.A.; Gallopoulos, N.E. (1989). Strategies for Manufacturing, Scientific American 261 (3): 144–152

14 McDonough W., Braungart M. (2002), Cradle to Cradle: Remaking the Way We Make Things, North Point Press, New York, USA

Three principles are essential in developing Cradle to Cradle:

- 'Waste equals food': everything is a nutrient for something else. Biological and technological 'nutrients' are reused as nutrients for natural and/or human production processes
- 'Use of current solar income': the use of energy sources that are renewable in the timeframe they are used
- 'Celebrate diversity': promoting and combining biological, cultural and conceptual diversity

These principles are key to any Cradle to Cradle development and are supplemented with other principles based on local conditions and interests. In this way, principles were further developed for the World Expo in Hannover (2000), and for the regional development of Almere (2008) and of Limburg (2008) in the Netherlands.

3 Cradle to cradle in the industry area

3.1 C2C theoretical framework – industry area (strategic)

Three different perspectives can be used to understand the implications of Cradle to Cradle for industry. The most common perspective is that of the product itself that is produced. Producing a product, however, involves a series of suppliers and partners. On a second level, Cradle to Cradle will have major implications on the wider level of the supply chain. Thirdly, it is foremost and evidently a totally new business concept. These different perspectives or levels are closely interlinked.

3.1.1 Cradle to Cradle on the product level

Developing products within the philosophy of Cradle to Cradle implies the use of the three basic Cradle to Cradle principles in the design and production stage; these are: waste equals food, use current solar income and celebrate diversity. Applying these principles will differ according to the type of the product and the region where it is produced. However, all Cradle to Cradle products match the ambition of creating healthy and safe products for man and the environment. These ambitions can be validated by means of a certification system. At this moment, products are the only group that can be Cradle to Cradle certified. Five modules are key when developing Cradle to Cradle products according to this certification system[15]:

1. **Material identification**
   Every single ingredient within a product needs to be identified and checked for quality with respect to human and environmental health. With this knowledge it can be assured that no materials present in the product are damaging to human health or the environment. Rather than eliminating substances, it is the aim to come to a list of positive ingredients.
2. **Material reutilisation**
   How can ingredients or the product be made fit for re-use after the end of the first use? In such a way, material cycles are made continuous.
3. **Sun as energy**
   How to use sun as prime energy source or, in a broader perspective: how can renewable energy be used during production.
4. **Water**
   A responsible attitude towards water usage needs to be shown. How to minimise water use and how to close the water cycles.
5. **Social responsibility**
   A commitment to social principles, i.e. matching social conditions on the workfloor and in the supply chain.

What are the implications of developing and producing products according to Cradle to Cradle?
When working according to Cradle to Cradle one needs to make a choice to develop a product belonging either to the biological or to the technical material cycle. This may seem obvious but it isn't, as a drinking cup can, for example, be made of PLA (bio-plastic) or synthetic plastic. In addition to this, if it is technically unfeasible to develop a product according to one single material cycle, and it is actually a mixture of both technical as well as biological ingredients, the design of the product needs to allow for easy separation of these ingredients after use of the product.

Real Cradle to Cradle development requires a wide set of criteria to be taken into consideration. These are human health criteria and environmental health criteria. There are five priority human health criteria that show some known or suspected human and/or animal effect:

- Carcinogenicity
- Disruption of endocrine system
- Mutagenicity
- Reproductive toxicity
- Teratogenicity

15 The C2C certificates are issued by McDonough Braungart Design Chemistry (MBDC). More information on the certification system can be found at http://mbdc.com/default.aspx.

There are additional human health criteria such as acute toxicity, chronic toxicity, irritation of skin/mucous membranes, sensitisation and others. Environmental health criteria are:

- Aquatic toxicity
  - Fish toxicity
  - Daphnia toxicity (water flies)
  - Algae toxicity
- Bioaccumulation
- Climatic relevance/ozone depletion potential
- Persistence/biodegradation
- Toxic heavy metal content
- Other

In addition to the ingredient list of the product the business processes in the production of the product also need to be scrutinised. Sometimes, a problematic substance in the product does not come from its ingredients but from something in or around the machinery used to produce it.

3.1.2 Cradle to Cradle in the supply chain

One prerequisite of developing products according to Cradle to Cradle is that knowledge of the ingredients of the materials needs to be complete. This leads rather soon to the realisation that not all the required knowledge is present in one company. Therefore, close collaboration between the suppliers has to be created as they deliver the ingredients or half-made products. Knowledge of the composition of materials is to be found in the supply chain, sometimes not even with the direct supplier but somewhere further along the chain.

Cradle to Cradle does not only have implications for suppliers. It also affects how the value chain is organised towards consumers, even after use of the product. It implies that materials can be returned after use which leads to the 'organisation of reverse logistics'. It needs to be noted that reverse logistics does not necessarily imply a return of the material to the original producer. Materials within a continuous loop can be collected by other partners in the chain and be returned to any producer in the production cycle.

3.1.3 Cradle to Cradle on the level of business

Creating products where every ingredient is known for its effect on human and environmental health and is selected for a positive contribution, creating products which need strong cooperation with suppliers and creating products where materials ought to come back after use implies that these ambitions need to be taken into consideration already at the outset during the design of the product. When designing from this perspective, one arrives almost automatically at innovation. As such, it is not surprising that Cradle to Cradle is first and foremost called an innovative business concept, with consequences at all levels including how products are sold or how strategic decisions are made within a company. On the sales level, there is a change towards leasing products instead of selling them (renting the use instead of ownership) in order to guarantee the return of end-of-use products. On the strategic level, companies such as Desso choose to implement a full Cradle to Cradle strategy[16] for the whole business in which it is operating. This involves the decision that any of the products in the portfolio will be developed according to Cradle to Cradle, that the whole energy supply of the company is redirected to renewable energy, that cooperation with the suppliers is strengthened to lead them too towards a Cradle to Cradle approach, that finally the whole business concept is innovative and will meet the demands of our society in the future.

16 Cradle to Cradle brochure downloadable at http://www.desso.com/Desso/home/EN/EN-Cradle_to_Cradle/EN-Cradle_to_Cradle-Cradle_to_Cradle.html

4 Principles, guidelines and good practices of cradle to cradle for industry

At present not so many industrial products integrally respect the three Cradle to Cradle principles. Consequently, the good practices collected and presented in the following text are to be read as inspirations to show, in practice, the application of some guidelines that the industrial sector should follow in order to gradually satisfy the requirements of the Cradle to Cradle approach.

The main goal of this part of the project is indeed to promote Cradle to Cradle as a driver for inspiration and innovation, and to develop knowledge and skills in different industrial environments, for big corporate as well as for small and medium enterprises, for manufacturers as well as for service suppliers.

4.1 Waste equals food

The main objective of this first principle is to create continuous loops, i.e. material cycles that respect and reflect the continuous loops (production, recovery and reproduction) of the natural cycles.

Different types of loops can be generated, where a material can be used:
- in closed cycles, i.e. the recovered materials are used to replace virgin ones in the production of the same disposed product or component from which they derive;
- in open cycles, i.e. the recovered materials are used for products or by manufacturers different from the starting ones.

Sanitary paper made from recycled paper | Van Houtum Papier bv

The company offers 'C2C closed loop supply chain sanitary paper' using waste paper from end users (governments etc) to produce their sanitary paper. The company cooperates with other actors along the value/supply chain, such as other researchers (DSM), material suppliers (mainly chemical), end-users (authorities, banks, airlines) and distribution partners. The paper residue is used as raw material for packaging for Smurfit Kappa, a corrugated cardboard box producer, whose plant is 5 kilometres from Van Houtum. Van Houtum collaborates with Van Gansewinkel Groep, a waste management company, for waste paper collection.

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Recovery can happen in different stages of the product life cycle and so it is possible to find:
- pre-consumption materials, i.e. scrap and rejects generated during the different steps of the production cycle;
- post-consumption materials, i.e. materials from products and packaging disposed of by the end user after the end of their useful lifespan.

Matrix | Officina dell'ambiente srl

Matrix is a secondary raw material that can substitute for materials extracted directly from nature; it is used in concrete production, just like natural clay. Matrix is a silicon-based chemical matrix, rich in iron and aluminium oxides, produced by Officina dell'Ambiente, an Italian company, by treating various types of waste on an industrial scale. The processing cycle of Officina dell'Ambiente ends with the total recovery of waste and its transformation into new, re-usable material. Waste is no longer waste, i.e. a problem, but a valuable product.

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The concept of 'continuous loops' perfectly matches the design and production of artefacts made from biocompatible materials, i.e. products whose materials, after being used, can be returned to the environment in a safe way as nutrients for the growth of other resources.

Manure packaging | Droog Design

Droog Design studio designed packaging for tulip bulbs made of dehydrated manure. The designers wanted, a little provocatively, to underline a specific problem of their country – a surplus of manure. Once it finishes its function as a box, the packaging does not produce waste because it can be used like compost or, if planted with the bulb, can directly enrich the soil. With this project, the designer made a proposal to solve at the same time the double-issue of disposing of the excess manure and producing tulip bulbs boxes.

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In other cases, materials from disposed products have to be reprocessed to obtain new secondary raw materials which can become food for new products.

Carpet tiles | Desso bv

Desso, a world leader in textile flooring thanks to its collaboration with the EPEA institute, produce Cradle to Cradle certified carpet tiles. Since with the Cradle to Cradle concept it is vital that every part of the carpets and carpet tiles is completely integrated into a technical or biological cycle, the company currently recycles its products in the cement industry where they are used as secondary fuel, and the stabiliser (chalk) is used as raw material to produce cement. The production processes are self-sustained thanks to the use of renewable energy sources.

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To completely exploit the potential of high value materials, without accepting to just ‘down-cycle’ them, and to directly profit from their recovery, a powerful strategy for companies is to keep the ownership of products and to sell to the customers just the satisfaction of their needs, through a combination of products and services, offered by the company autonomously or even in collaboration with other actors in the value chain.

Digodream | Diddi & Gori spa

Digodream is one of the offers to exhibiting firms participating in trade fairs and exhibitions made by Diddi & Gori, an Italian company in the footwear and textile flooring sector. With Digodream, Diddi & Gori provides to its customers the final result of having textile flooring, with no ongoing concerns for the product.
Digodream is sold as an entire service, from supply and installation to removal, given as a full service to the client, who is no longer the owner of the product (flooring), but rather buys its utility. Earlier, similar products were bought, used for a short period of time and then had to be removed and disposed of. In contrast, Digodream, after being used, is collected by Diddi & Gori, who recover it to make fibres again. The textile materials have been designed to be easily recyclable for the production of new flooring and since Diddi & Gori remains the owner of the product over its life cycle, there is a further economic interest to enhance the material’s lifespan.

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With this approach, companies can easily recover their products at the end of their useful lifespan to reuse their materials and complement their offer with added value life cycle services, such as maintenance, repair, adaptability and upgrade. Then, by properly designing their system, companies can also reintroduce replaced components as spare parts or food for new components or other applications.

Mirra chair | Herman Miller Inc.

The Mirra chair, produced by Herman Miller, is designed for a 30-year lifespan. When the chair is repaired or dismissed, its return to the company and the reuse of components are guaranteed without any cost to the consumer. The chair is designed to facilitate product disassembly, both the removal and replacement of worn parts (thus extending the useful life of the chair), and its disassembly when the chair is disposed of. This is a Cradle to Cradle certified product.

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When designing a product in order to close the loop it is important to select materials considering not only their specific chemical and physical characteristics but also if there are technologies available (that exist or are under development) to completely exploit their potential at the end of one cycle, i.e. to retain their value once recycled. Another key factor to be considered is if there are actors and facilities in the industrial context where the company operates to facilitate product recovery and material reuse.

Loopla | Galactic SA/NV

Galactic is a green Belgian chemical company that produces lactic acid by fermentation of a biomass. Among other applications lactic acid is used as a starting material for the production of polylactic acid (PLA), a renewable biopolymer used for packaging and other convenience applications.
Galactic developed Loopla, a recycling technology conceived as a closed loop where PLA wastes are recovered in order to recycle them into its monomer, the lactic acid, which can then easily be polymerized in order to recreate a new PLA with the same characteristics as the original one. As also underlined by the company itself in its website, the success of the concept depends 'on the different actors or partners involved in the closed loop. The end user must be aware of the importance of sorting his waste. The sorting and recovery entities have to take a greater interest in the installation of new technologies able to sort PLA from other garbage. The lactic acid obtained by chemical recycling has to be in the specifications required by the PLA producers in order to manufacture new PLA objects'.
Many festival organisers ask Galactic to take care of the recycling of PLA products (cups, dishes, etc) used during events. The company offers its customers not only a technology but a full service, from collection to sales, including transportation from the festival to Galactic's facilities to start the recycling process.

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As already said (cf. 3.1.1), in a Cradle to Cradle approach it is of the utmost importance that a company knows all the materials and substances contained in its products, in order to better manage their re-use and to maximise the use of 'positive ingredients'.

Erutan project | James bv

The Dutch companies James, Best wool carpets and Bond, supported by the European Regional Development Fund and OP-Zuid, have collaborated to develop a new carpet production cycle with reduced environmental impact (less toxic and more renewable materials and energies). The carpet is made from natural products only. Instead of using latex, the tufted carpet is attached to backing made from natural material via a new innovative bioprocess (a proof of concept showed that the stabilization of the backing is also possible by the methods mentioned above). The dyeing of yarns is reached via bioprocesses and nanotechnology, which means they can be dyed at 40°C instead of 95°C. It has been shown that, if natural dyestuffs are used to enlarge the colour range of carpets made from wool, there is a significantly lower use of water and energy. The usage of natural products without harmful chemicals makes it possible to close the loop. The carpet can then be used for 100% as input for a second life cycle.

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In order to facilitate material sorting and identification, it is necessary to designate constituent materials (it is better if they have standardised codes), especially in case of complex products, or materials for which the recovery route is not strictly organised and or products that are not uniquely part of a biological or technical metabolism.

It is obviously useful to minimise the number of incompatible materials used within a product (or more easily within a component), also paying attention to joints, in order to avoid the need for disassembly, since this phase also has an economic and environmental cost. Where it is not possible, for various reasons, to use compatible materials, it is useful to design the product for easy separation of its parts. The contamination of materials, leading to low-quality recycled material, and/or long processes for the separation of products and components made of incompatible materials, generating high costs for disassembly, can make the whole process economically unfeasible.

Very chair | Haworth Inc.

Haworth launched the Very family of seating, designed by Simon Desanta, in collaboration with Haworth Design Studio. The design engineers at both companies used sustainable materials and environmentally conscious design practices throughout the Cradle to Cradle programme. The highly sustainable chair is made of up to 71% recycled material, it's 98% recyclable and can be disassembled for recycling in less than 5 minutes. As a result, Very has been recognized with a number of awards.

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Another useful suggestion is to facilitate the collection and transportation of disposed products, since these are the activities that often jeopardize the environmental and economic viability of the whole recovery process. In dealing with these aspects it has to be remembered that waste managers, national associations for material collection and recycling companies can be involved in the activity.

Earthkeepers 2.0 boot | The Timberland Company

The Timberland Company has presented its Earthkeepers 2.0 boot. The boot is designed to be disassembled and recycled, rather than discarded. Boots may be returned to any Timberland store for recycling at the end of their life cycle, becoming technical nutrients for the production cycle of new shoes. 'We can deliberately design the greenest footwear out there - but if at the end of the day those products still end up in a landfill, we haven't really closed the loop on our environmental responsibility,' said Brian Moore, Vice President, Global Men's Footwear at Timberland. Timberland says 80% of the Earthkeepers 2.0 boot can be recycled or re-used, including:

- the leather that is refurbished at the company's factory in the Dominican Republic;
- the Green Rubber soles that will go back to the Green Rubber factory in Georgia for recycling; Green Rubber's D-Link technology breaks down tyre-rubber so that it can be repeatedly recycled into new products, including Timberland outsoles;
- removable metal hardware that can be reused in new footwear or recycled;
- polyester lining that can be recycled into new polyester products.

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4.2 Use of current solar income

The second Cradle to Cradle principle states that it is important to avoid the use of non-renewable energy sources and not to deplete energy sources, in order to safeguard the environmental capital for future generations. It is also important not to choose toxic or harmful energy sources.

These choices have to take into consideration all the stages of the life cycle of industrial products (i.e. energy and material production, component production and assembly, distribution, use and disposal) and all the processes that characterise the product's life, and consider which energy source of those available provides the same level of performance with the lowest environmental impact. One of the most interesting sources of renewable and 'clean' energy is solar power, a constant energy source. It can be used to generate electricity (photovoltaic power generation), to generate heat (solar thermal energy) or cold (solar cooling).

Eco-pallet | Palm spa

Palm is an Italian pallet producer. Its customised products are designed to optimise weight and volume of packaging, with the aim of using less material and reducing waste. Palm uses wood from North Europe, which is FCS (Forest Stewardship Council) and PEFC (Programme for Endorsement of Forest Certification schemes) certified. With the 'Pallet km zero CO2' project, Palm became the leader of an initiative for the local planting of poplars, with the aim of promoting economic development and agriculture of the territory and reducing the environmental impact due to wood transportation over long distances. Palm uses electricity from renewable sources and is a member of the consortium which supplies it (Eaux de la Valle - LifeGateEnergia). Palm offers a recovery service and reconditioning of damaged pallets owned by customers. Palm collaborates with many manufacturing and distribution companies in order to create 'sustainable value chains'.

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Brighten Up series | Solatube International Inc.

Solatube International, a US based company, produces the Brighten Up series, a set of daylighting systems using natural light to illuminate interiors. These are tubes with different bending radiuses which are coated with a reflective material that canalises natural sunlight and directs it inside both residential and commercial buildings. The product consists of three units (collector, tube and diffuser). The collector is made up of a support, usually placed on the roof of the building, and a transparent cupola with Raybender technology. The tube has the function of directing the light collected by the collector towards the interior to be illuminated, reflecting the sun's rays on the internal walls of the tube. The diffuser avoids dazzling, distributes the luminous flux and makes the tube hermetic.

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Decentralised renewable energy systems | Qurrent renewable energy bv

Qurrent is a Dutch enterprise whose aim is to provide a combination of devices, software and services that enables the creation of small, local, community-based energy networks, mostly privately owned. Qurrent teaches people how to produce and manage renewable energy (e.g. with solar panels or wind turbines) on their own, also offering them a device, called Qbox, responsible for allocating the supplies within the local network so that higher demands from one household can be satisfied with superfluous energy generated by another home. With the help of a smart network, the Qbox can also determine when it is most efficient to run certain appliances and schedule cycles accordingly.

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Even though the importance of solar energy must be recognised, other energy sources should not be disregarded, including first and foremost muscular energy, which is especially useful for those products that require limited power or for hybrid systems.

Pavegen | Pavegen Systems Ltd

Pavegen Systems is a UK enterprise that has created Pavegen, a system that uses electricity produced from walking on specially designed pavement slabs to power street lights and subway stations by exploiting piezoelectric energy. The green slabs, covered with a layer of rubber recycled from old car tyres, have a disc in the middle that glows when it is stepped on. Every time the disc is compressed the energy is converted into electricity stored in an internal battery with wires connecting it to a light source to transmit the electricity. Slabs are placed in areas where at least 50,000 steps are taken every day.
Some similar projects have been developed around the world, e.g. in Japan by Soundpower Corporation (www.soundpower.co.jp), for different experimental applications. In the case of Pavegen Systems, three test installations have been run, in partnership with the City of London, using Pavegen slabs around bus stops to illuminate them, and at pedestrian crossings to help light them up at night and draw drivers' attention to,them. The company says that on average just 5% of the energy generated in high traffic areas will go to lighting the LEDs in the recycled rubber paving slabs, while the rest can be channelled to other uses.

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Other interesting renewable energies include wind power, marine or hydroelectric power from wave motion, energy from biomass (from waste) and geothermal energy.

Wissington Factory | British Sugar plc

The Wissington plant of British Sugar is the 'largest beet sugar factory in the world'. Three million tonnes of sugar beet are produced by some 1,500 UK growers, at an average distance of 50 kilometres from the factory. Beet sugar is then produced, exploiting, with a carefully organised system, different fractions of the production waste to obtain high quality topsoil, stone aggregate, animal feed, a bioethanol component, healthcare and cosmetic ingredients and the generation of heat and power. In particular, the combined heat and power (CHP) plant is at the heart of Wissington factory's operations. It produces steam and electricity using gas turbine technology. Over 50 MW can be exported into the local electrical grid while the flue gas which traditionally goes up the chimney is diverted to the adjacent greenhouse. This provides heating and CO2 which is essential to promote the growth of classic round and speciality salad tomatoes (Wissington is the UK's largest grower of this produce). Natural predators, such as bumble bees, are used to control pests. Over 200 km of heating pipes carry recovered heat from the adjacent factory to maintain optimum temperatures, eliminating the need to burn additional fossil fuels. The greenhouse even recycles rainwater from the roof, along with other water, to irrigate the crop.

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4.3 Celebrate diversity

The third funding principle of Cradle to Cradle, 'Celebrate diversity', means promoting and combining biological, cultural and conceptual biodiversity. A higher level of diversity means that more productive functions are possible, for the ecosystem and the Planet.

To respect diversity in designing an industrial product means to take into consideration not only how it is made but also who will use it and how, in different ways, places and moments. Industries can follow this principle in many ways. They can design, for example, products and offers that can be adapted and changed in relation to different phenomena: technology evolves but the environmental context in which the product is used, and the physical and cultural characteristics of the user, can evolve as well. Upgradability and adaptability should then be facilitated and it is necessary to design flexible, modular and reconfigurable products, in relation to dimensions, performance and appearance.

Tripp Trapp chair | Stokke AS

The Tripp Trapp chair, created in 1972 by the designer Peter Opsvik and produced by Stokke, a Norwegian furniture manufacturer, is the only chair that can seat the user from baby to adult, in constant safety and comfort, by adding or taking away some components or rearranging their position.

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Companies can also offer solutions that facilitate the adaptation of spaces, buildings and workplaces to different uses and evolving needs.

Moveable walls for offices | Sorin srl

Sorin is an Italian company which produces a series of moveable solutions for room division in workplaces. These moveable partition walls are designed to allow the maximum flexibility in the organisation of spaces dedicated to clerical work and can be easily moved to adapt to the evolution of the company's needs. The partition wall is made to house electric wires, EDP cables and multimedia systems.

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These suggestions can be set against the current trends of the present economic model, where often the value depends on owning as many products as possible and replacing them with new ones as frequently as possible. Then design has to come with a proper, innovative marketing strategy that aims at gaining, for instance by guaranteeing performance, the favour of the users, and appealing to them with the possibilities offered by adaptability, customisation and the social value of sharing products.

The stimulus for industries and designers should lead to products which acquire value as time goes by, leaving them surrounded by an emotional, affective halo, and whose value is not in ownership but in using them as tools to benefit from high-quality services. To favour diversity while increasing the satisfaction of users, it is important to involve them in the project, to take decisions together and collaborate in the definition of the expected result.

As with the other principles, also in this case collaboration among all the actors, with interrelated roles and tasks, is of the utmost importance. Industries that respect diversity use local materials and energy and do not think about themselves as autonomous entities, separate from the nearby culture and landscape; instead they adapt their offers to local traditions and tastes.

Agricultural products | Agrindustria snc

Agrindustria is an SME in the Piedmont region in Italy. Thanks to collaboration with Politecnico di Torino university and Tecnogranda di Dronero, Cuneo (a scientific and technological park for agro-industry), Agrindustria has reduced the toxic emissions of its production cycle, shifting from a linear production system (which produces useless waste and scraps) to an open production system, where the output of one company is the resource for the company itself and for other local enterprises. In particular, Agrindustria has achieved (thermal and electric) energy self sufficiency and, by involving different actors in its same territory, fostered the birth of new products and services that have generated regional economic development and allowed preservation of the natural heritage of the area (e.g. the main part of the biomass used in the company comes from the clearing of brushwood in the nearby alpine communities and from the disposed matter of pallet manufacturers, while using nut shells and corncob fibres to make flour and other products).

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5 Lessons learned

As discussed in the previous chapters, the Cradle to Cradle approach is based on the principle that the change of the present production and consumption system, made necessary by the indiscriminate exploitation of our Planet, will have to result from positive choices, whose outcome should be perceived as an improvement of the quality of life, and not as a loss.

As a conclusion, to present a complete scenario to those interested in Cradle to Cradle, a few considerations about barriers to and tools for Cradle to Cradle diffusion are presented[17], summarising what emerged during good practices collection and also giving a platform to the words of some good practice owners, in order to provide a 'vision from the inside' of the Cradle to Cradle world in action.

5.1 Barriers to the diffusion of the approach

The main barriers to the diffusion to a complete Cradle to Cradle approach seem to be socio-economical ones, both inside and outside the company. Companies find difficulties in changing their own company culture and business model: a set of tools and competences to start promising projects are needed and they are not always present and settled within the companies.

'As Cradle to Cradle is a strategic decision for a company to make it requires a proper implementation in the entire company. This requires organisational changes, which is always a challenge. Training staff is an essential part of this.'
Van Gansewinkel Groep bv (the Netherlands)

Moreover, investments (both publicly and privately funded) in new technologies and materials are needed.

'Chemical recycling is a very innovative concept, specific to Bioplastics and PLA in particular. Among the current challenges faced: lack of recycling facilities in the world (high investment needed)'
Galactic SA/NV (Belgium)

As already said, one of the most important conditions for implementing a Cradle to Cradle approach is that a company should contact and collaborate with all the other stakeholders in its value chain (suppliers, customers, end users, public bodies) and this is often not the case.

'By working closely together with our customers on developing closed loops we can intensify the relationship with our customers, maximise the recovery of raw materials, preserve natural resources and create extra value in the entire value chain for all parties involved'.
Van Gansewinkel Groep bv (the Netherlands)

'Palm is a founding member of Ecofriends (www.ecofriends.it). The mission of this association is: accelerating the creation of a sustainable economy, equity and solidarity, developing a platform of social relations and practical cooperation between the companies and individuals who have chosen to take responsibility for creating the future in which we want to live'.
Palm spa (Italy)

In order to also involve customers and end users, especially in industrialised contexts, it is important to make them understand and embrace the necessary change in purchase and consumption behaviours: access and use instead of ownership, bigger initial investment that turns into economical and environmental benefits in the medium to long term, increased environmental and social sensibility in relation to purchases, and collaborative design.

'Our service had to face a market that is not very open to alternative systems, thus causing useless and even harmful stops in project development'.
eGo (Italy)

'The values of the Green Pallet project are not always properly recognised, since it is often associated with just an increase in costs and not with an increase in value'.
Palm spa (Italy)

In the opinion of some of the actors involved, companies should be supported by a set of regulations and incentives to facilitate, enable and fund at least the start-up of innovative projects. On the contrary, regulations are often seen as additional barriers to the development of promising proposals, public incentives are limited and certification (namely the different types of environmental certification available nowadays) is burdensome and not stabilised.

17 The views expressed in any quotes or interviews are the views of the interviewee or quoted person alone, and do not necessarily reflect the views of the Cradle to Cradle Network nor should they be taken as statements of policy or intent of the Cradle to Cradle Network.

'There are some legal limitations which still classify recovered materials as "waste" instead of raw materials'.
Van Gansewinkel Groep bv (the Netherlands)

'To integrate the Cradle to Cradle principles into our activities they should be more stimulated and rewarded from governance or via other competitions. Cradle to Cradle must be an attitude and not a must. Only in that case can you be convincing.'
James bv (the Netherlands)

'Our first contact with EPEA (Environmental Protection Encouragement Agency) was not convincing. We got the impression that you must be very important or that you have to invest a lot of money before EPEA starts to work for you'.
James bv (the Netherlands)

5.2 Tools for the diffusion and development of the approach

The road to a full adoption of Cradle to Cradle approach in the industry sector is not plain and easy, but, also on the basis of what was gathered by the good practice owners contacted during the project, it seems that this could be the right moment and that opportunities are arising.

First of all, many enabling platforms to facilitate and increase the technical competences related to Cradle to Cradle design are developing: from on-line services on different fields related to Cradle to Cradle to training courses and digital tools that provide technical support and manage the development of industrial proposals that integrate environmental requirements in design and production practice.

Cradle to Cradle Master Class | Erasmus University Rotterdam

The Erasmus University in Rotterdam (the Netherlands) offers a four-day intensive Cradle to Cradle Master Class, for academic staff from universities and universities of applied science in the Netherlands, Belgium, Germany and Scandinavia who want to develop Cradle to Cradle courses or get more input for their existing courses.

Erasmus University Rotterdam - Erasmus Academie
Postbus 1738
3000DR Rotterdam
the Netherlands
Phone: +31 (0)104082794
E-mail: poleij@erasmusacademie.nl
Website: www.eur.nl/erasmusacademie/allecursussen/management_beleid/c2c
Example provided by
Dalia Gallico
piazza Castello 22
20121 Milano – Italy
Phone: +39 (0)28690993
E-mail: dalia@dalia.it
Website: www.dalia.it

Certification can be a useful tool to give visibility to innovative solutions. As already mentioned in section 3.1.1, in 2005 McDonough Braungart Design Chemisty (MBDC) started to issue Cradle to Cradle certificates at the demand of industry for products developed according to the Cradle to Cradle™ Design principles. The list of certified products can be found on www.c2ccertified.com.

'C2C immediately helps to profile the company as an innovative frontrunner.
In the long run the company is also convinced that C2C will be more economical'.
Van Houtum bv (the Netherlands)

Many public events and projects are organised for awareness raising and for diffusion, at different industry levels, of the concepts at the basis of the Cradle to Cradle approach, even before talking about design and practicalities. There are many interesting examples of public initiatives, such as the C2C design action and Ecobooster project, launched by ARDI – Centre du Design Rhône-Alpes (France) to raise companies' awareness about Cradle to Cradle and help them integrate this approach into their practice, and Ecoprofit, a public programme to increase the awareness of ecology and sustainability in companies, launched by the city of Graz (Austria).

Public bodies at regional, national and transnational (such as European Union) level are supporting projects to make a dialogue of public and private interests in order to create favourable opportunities for interesting proposals to be developed or to focus and promote existing good practices that can inspire other companies to take up the challenge (as in the case of the Cradle to Cradle Network).

Suffolk Materials Exchange | Eastex

Eastex is a free online information service where organisations and individuals view and place information about redundant stock and surplus raw materials. It is a regional UK project funded by local authorities. The project's applicant is Peterborough Environment City Trust. A materials exchange actively exploits the principle that one company's waste is another's raw material. By automatically matching these parties via the internet, unwanted materials can be efficiently passed on or sourced – either once or as an ongoing arrangement. It delivers real financial savings for businesses, organisations and individuals and keeps potentially useful materials in circulation.

www.eastex.org.uk

Finally, as said, the production and consumption system has to be considered as one big network of different public and private actors, organisations, technologies, territories and resources. In this perspective the system has to be seen as the sum of partial and interrelated contributions that can lead to substantial economic, environmental and social innovations only when all the actors are involved. When this happens, successful partnerships are created and really positive results are produced.

Waste management support | The Van Gansewinkel Groep bv

Van Gansewinkel Groep represents a good example of how collaboration within the value chain is essential for the realisation of Cradle to Cradle projects and for their success. Van Gansewinkel is a waste management company which partners with different industries (e.g. Van Houtum Papier, MOSA, Philips, Desso) to help them close the loop in their Cradle to Cradle projects, contributing with its expertise about materials, waste management and energy generation.

The Van Gansewinkel Groep bv
Flight Forum 240
5657DH Eindhoven
the Netherlands
Phone:
+31 (0)407514522
Website:
www.
vangansewinkelgroep.com

Private/public collaboration | Kuhmon Lampö

The city of Kuhmo in Finland is an excellent example of local enterprises and communities co-operating to produce and use bio-energy. Kuhmo (sawmill) Ltd. and Kuhmo Lämpö (heat and electricity) Ltd. act as pioneers in the loss (waste) energy recovery (recycling) process. Sawdust from the saw mill is dried using combustion gas, and the dried sawdust is compressed into briquettes. The combustion waste, ash, is now used as fertilizer in peatland forest nearby. District heat is provided and waste wood (bark, sawdust) recovered in thermal process.

City of Kuhmo
Kainuuntie 82
88900 Kuhmo – Finland
Phone:
+358 (0)86155521
Website:
www.kuhmo.fi

Supply chain collaboration in the furniture sector | Bosco Mobile (BO.MO.)

Bosco Mobile is a project financed by the Lombardy region in Italy with the aim of creating a short supply chain in the wood-furniture sector in the region, applying eco-design principles (LCD and C2C) throughout the whole supply chain. The main aims are:
to promote the use of certified regional wood stock to realise pieces of furniture;
to perform an analysis of sustainability of the wood furniture value chain, with the aim to optimise materials and energy flows and to reduce the overall impact on environmental compartments;
to integrate sustainability into the design and organisation of the entire supply chain operations as main environmental policy;
to create a local system which is sustainable and competitive in the private as well as in the public market (especially green public procurement).

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6 Appendix – insights from good practice owners and sustainability experts

In the following section, contributions are presented from different actors[18] who are working to promote environmental sustainability in different fields. The aim is to stimulate and provide practical advices on how to start Cradle to Cradle initiatives.

Two different types of contributions are presented:

1. Interviews with good practice owners, collected within the development of this project; three standard questions were asked, in order to give the persons interviewed the possibility to say something about their own experiences and to talk about enabling factors, interesting or hard relations with other stakeholders and difficulties and barriers found in the diffusion and the development of their good practices;
2. Views from sustainability experts, collected by Dalia Gallico (unless otherwise specified). In this case the texts are less structured, without standard questions, and many of the experts did not specifically talk about Cradle to Cradle but about sustainability in general, with a vision that is nonetheless really similar to that of Cradle to Cradle and its main principles. They talked about processes, products, projects, events, principles and strategies that, at different levels, represent examples for that transition path that can lead the industry sector to gradually integrate the Cradle to Cradle approach in its practice and to obtain successful results on an economic, environmental and social level.

6.1 Interviews with good practice owners

Interview with Mr Geelen, Van Gansewinkel Groep bv (the Netherlands)

Question 1

What made your company decide to start the project/integrate the Cradle to Cradle principles into its activities?

Waste no more. That's the pay-off Van Gansewinkel Groep is using in its communication to the world. Van Gansewinkel Groep does not see 'waste' as something useless but as the beginning of something new. That is what Van Gansewinkel Groep has been doing over the last 45 years. Currently 75% of all the waste that we process on a yearly basis is given a second life. Our goal is 100%. This can only be done by looking into the production process of 'future waste'. By giving producers insight into recycling processes, techniques and end-of-life treatment methods, this valuable information can be used by producers as a design input for new products. This way raw materials stay in the loop and can be reused without any loss of quality, preserving the natural resources. Cradle to Cradle is therefore a tool in achieving the end goal of 100% material recovery.

Question 2

What does your company expect in return for its commitment (an increase in sales or income, a better image, new or improved relations with the other actors in the supply/value chain, the opening up of a new market or segment)?

By working together closely with our customers on developing closed loops we can intensify the relationship with our customers, maximise the recovery of raw materials, preserve natural resources and create extra value in the entire value chain for all parties involved.

Question 3

What kind of difficulties is your company facing or has your company faced in integrating the Cradle to Cradle principles into its activities? What do you think could be most useful to overcoming them (public incentives or regulations, training for industries and awareness raising campaigns, schemes for building innovative public/private partnership/better governance, certification and awards promotion)?

As Cradle to Cradle is a strategic decision for a company to make it requires proper implementation in the entire company. This requires organisational changes, which is always a challenge. Training staff is an essential part of this. Becoming Cradle to Cradle is also a step-by-step process and does not happen overnight. Financial incentives to stimulate research on specific material compositions could help. There are also some legal limitations which still classify recovered materials as 'waste' instead of raw materials.

18 The views expressed in any quotes or interviews are the views of the interviewee or quoted person alone, and do not necessarily reflect the views of the Cradle to Cradle Network nor should they be taken as statements of policy or intent of the Cradle to Cradle Network.

Interview with Mr Bas Gehlen, Van Houtum bv (the Netherlands)

Question 1

What made your company decide to start the project/integrate Cradle to Cradle principles into its activities?

- Natural fit with business proposition of Corporate Social Responsibility (CSR): history of continuously improving environmental footprint
- C2C provides an excellent combination of innovation and CSR
- C2C immediately helps to profile the company as an innovative frontrunner. In the long run the company is also convinced that C2C will be more economical:
- New and better business model connecting partners in the chain
- In the long run cheaper operating cost (cost of water, waste, energy, minerals will all go up)
- Hope that C2C will become standard element of 'licence to operate' also in environmental permits: as soon as C2C is possible: why not do it?

Question 2

What does your company expect in return for its commitment (an increase in sales or income, a better image, new or improved relations with the other actors in the supply/value chain, the opening up of a new market or segment)?

See answers above:

- Short term: innovative and CSR profile is helping to get attention from end-customers in our chain, hopefully even linking with them in closed loop supply chains
- Long term: lower costs and standard element of licence to operate

Question 3

What kind of difficulties is your company facing or has your company faced in integrating Cradle to Cradle principles into its activities? What do you think could be most useful to overcoming them (public incentives or regulations, training for industries and awareness raising campaigns, schemes for building innovative public/private partnership/better governance, certifications and awards promotion)?

Address both economics and environment together

- combination of sustainability and innovation

Stimulate local C2C loops

- set the example with buying power
- promote front runners in tender processes
- promote on all levels to industry and consumers
- remove legal barriers (waste = food) at least in innovation/trial phase

Foster education and development

- incorporate at all levels
- focus existing financial support systems

So no focus on extra incentives, but awareness raising by, for instance, setting the example.

Interview with Christine Kempchen, James bv (the Netherlands)

Question 1

What made your company decide to start the project/integrate the Cradle to Cradle principles into its activities?

James wants to develop into a knowledge centre. The first important step towards this direction was set with the development of the worldwide unique testing machine, Quality Maintenance Control 007 (QMC-007), for standardised testing of the cleaning and maintenance possibilities of carpets and upholstery fabrics. With this development in 2007 we proved that we have a high innovative potential with regard to other players in the market. Within our scientific network of European universities and R&D organisations we obtain valuable knowledge of textile applications and technical improvements. In discussion with these international partners we had the idea to revolutionise the traditional carpet production process by enzymatic crosslinking of natural materials (wool with linen) instead of using synthetic materials such as latex. Furthermore a new dyeing technology will be developed which saves 90% of dyestuff and even more energy and time. With the development of these technologies James can deliver a substantial contribution to the better use and re-use of materials. As a single SME we did not have enough manpower and finances to do so. That was the reason to employ an innovation manager and she applied successfully to a European fund with two more SME partners. Within the next two years we will therefore bring our initial idea on the market for consumers and industries (the so-called ERUTAN project).

Question 2

What does your company expect in return for its commitment (an increase in sales or income, a better image, new or improved relations with the other actors in the supply/value chain, the opening up of a new market or segment)?

As soon our ERUTAN project comes to its end, we will introduce the first real Cradle to Cradle carpet. With ERUTAN the biological cycle of a technical product such as carpets is closed. In contrast to what other industrial partners claim, the new carpet is completely 'recyclable' by giving the whole carpet a new second life (and not only parts of it). We expect an increase in sales and income, a better image on the global market and new and improved relations with other partners in that market. The ERUTAN process and technologies can be used by other carpet manufacturers as well, therefore we expect a revolution in the carpet world. This is not only a technical revolution, but will also lead to fewer production costs (due to the potential savings of raw materials and energy). We will create a completely new market for real Cradle to Cradle products and initiate global thinking on how we can contribute to making the earth healthy again.

Question 3

What kind of difficulties is your company facing or has your company faced in integrating the Cradle to Cradle principles in its activities? What do you think could be most useful to overcoming them (public incentives or regulations, training for industries and awareness raising campaigns, schemes for building innovative public/private partnership/better governance, certifications and awards promotion)?

Our first contact with EPEA (Environmental Protection Encouragement Agency) was not convincing. We got the impression that you must be very important or that you have to invest a lot of money before EPEA starts to work for you. We detected lots of rules and hurdles that are counterproductive when you have a terrific idea. If Cradle to Cradle is meant for better social living, it should be very easy to realise. In our company we fully underline the Cradle to Cradle principles, but we do not agree with the fact that a C2C certificate has something to do with money you are willing to pay and that such ideas must be the property of the persons who invented the idea. To integrate Cradle to Cradle principles into your activities you should be more stimulated and rewarded for governance or via other competitions. Cradle to Cradle must be an attitude and not a must. Only in that case you can be convincing.

Interview with Steve Dejonghe, Galactic SA/NV (Belgium)

Question 1

What made your company decide to start the project/integrate the Cradle to Cradle principles into its activities?

The core business of Galactic is green chemistry; we manufacture an extensive range of fermentation-made natural products and are among the major actors in the lactic acid market, a raw material for PLA manufacturing. Stepping into bioplastics was therefore logical growth, answering the green principles of the company while consolidating core activities. The C2C recycling technology proposed by Galactic is unprecedented in the (bio) plastic industry.

Question 2

What does your company expect in return for its commitment (an increase in sales or income, a better image, new or improved relations with the other actors in the supply/value chain, the opening up of a new market or segment)?

PLA and the recycling thereof are strongly connected. Nowadays, a new material can only be viable on the long run if its end-of-life options are fully understood and integrated in recycler's economic model. Since the waste material is recovered and not 'lost' as in incineration or composting, a value chain can be created and recycling schemes put in place.

For Galactic, this also means:

- Recognition as a green chemistry actor
- New outputs for lactic acid (PLA manufacturing)

Question 3

What kind of difficulties is your company facing or has your company faced in integrating Cradle to Cradle principles into its activities? What do you think could be most useful to overcoming them (public incentives or regulations, training for industries and awareness raising campaigns, schemes for building innovative public/private partnership/better governance, certifications and awards promotion)?

Chemical recycling is a very innovative concept, specific to bioplastics and PLA in particular. Current challenges faced:

- Although rapidly increasing, low volumes of PLA found on the market (and consequently, lower waste volumes)
- In most cases bioplastics are not integrated in collection schemes
- Lack of recycling facilities in the world (high investment needed)
- Low awareness of the existence of this new end-of-life option (industry/consumer)
- Technology ahead of regulation

Solutions:
- Ongoing research opening the way to new PLA application, substantially increasing PLA volumes
- Networking/partnership with key players among the PLA chain (producers, end-users, recyclers
- Increased PLA volumes will allow investment in additional recycling units
- New regulations specific to bioplastics (to be integrated in EU directives and national transposition thereof)
- Public awareness campaign

6.2 Interviews with sustainability experts

Views from John Thackara

John Thackara is known internationally as the Director of Doors of Perception, a network for innovation in design (www.doorsofperception.com). The network creates projects and events in which designers, working with other planners and local communities, develop new services and products for everyday life. This unique network, which aims to change the paradigm of design, is inspired by two questions: what would life be like in a more sustainable world? What steps should design take to lead us towards a sustainable world?

The importance of places

'I think it is important to get rid of the idea that there is some universal solution on the issue of sustainability; no doubt there are some basic ideas but the way they are applied and implemented changes significantly depending on where this happens. What can a region do to be sustainable? For us, this is the main question and the answer to it lies in experimenting, in many different ways, with the reorganisation of our daily activities. This calls for the participation of designers, but also the public, farmers, politicians and so on'.
www.venturabroadcast.com/beta/webzine_02_it.htm

What it means to be an expert

'I'm supposed to be an expert in sustainability, but it still gives me a headache to try and keep updated on issues such as the Triple Bottom Line, the three basic principles (and the four system conditions) of The Natural Step, the ten Guiding Principles of One Planet Living, the three forms of solidarity of the World Wildlife Fund, the ten principles for sustainable city governance of the Copenhagen Agenda, the eight doorways of the Sustainable Schools Network, the twelve indicators of the Earth Policy Institute, the eleven principles for a sustainable city (developed by Montreal) and the ten Hannover Principles promulgated by Bill McDonough'.
Taken from In the Bubble, design per un futuro sostenibile_intervista Arte Ecologia Sostenibilità 24.04 – 19.07.2009
www.strozzina.org/greenplatform/i_thackara.php

A world planned and designed on a human scale

'Design has two sides: on the one hand, every two or three minutes, somewhere in the world, an object is designed and produced by designers. This means too many infrastructures, too much waste and excessive energy consumption. And this is largely the responsibility of design'.
'On the other hand, I believe that design represents an opportunity to help people overcome these difficulties, for example by reducing waste and the consumption of energy and resources. This is a strange period, in which many designers think that the solution lies in designing new eco-friendly, green products, but I do not agree with them, I do not believe in this option; we already have too many products. We must reverse the trend: design less "things" and help people have a better quality of life'.

Design and resource optimization

'I believe that the solutions to many problems should be sought locally; they should be place-based. Design in this sense can help, not by producing new objects, rather by collaborating with people and helping them to organise their daily activities more easily. For example, by promoting direct producer-consumer relations in the distribution of food or by organising a different form of mobility. I think that design can help us share most resources in a more efficient manner'.

To improve, not to start again from scratch

'I do not think that all houses can be replaced with eco-sustainable buildings; we have neither the money nor the time nor the resources to implement such a project. However, what we can do is to localise cultivation or the use of drinking water. We will see new applications arising in our homes, such as water recycling or the use of plants'.

The importance of relationships

'Our interpersonal relationships should be based on trust and on giving each other a chance. Part of the problem lies in thinking about sustainability too abstractedly. If I think about how I can help even only five people in my city to grow food together, or to be together with their children, or to collect water or

whatever else, all these things seem very practical and might even be interesting and fun. Quite obviously, to take care of someone increases our relationships, on which we necessarily depend'.
From John Thackara:
"Ecco il futuro del design" interview by Rudi Bressa
www.lifegate.it

Interview with Best UP - Bello equo e sostenibile

Best Up - Bello equo e sostenibile (Beautiful, fair and sustainable) was founded in Italy in 2007 by Clara Mantica and Giuliana Zoppis. Made up of a non-profit organization and a communication agency, it promotes sustainable living through publishing initiatives, educational projects, and events that foster dialogue and the sharing of knowledge and experiences between industry players.
www.bestup.it

It's time to do something. In the right direction

Here are some of the contents that have arisen from the experience of Best Up and of the many people encountered during these years of commitment to promoting sustainable living: 1, 10, 100, 1000 positive realities, both large and small. Intelligent people and ideas: innovative, active in every part of the territory. Friendly, rooted and forward-looking. Generous, to themselves and to others. Here they are:

1 Because what counts is the people. Just one single person, sometimes, is sufficient to change a situation, to generate new processes. Each one of us can be that person, you need to believe in improvement and pursue your talent. The first act of a sustainable path is to enhance human resources.
2 Take responsibility, take action. Get up!
3 Because union is strength. To enhance relationships, networks. To share, to create a system and to create alliances. To support each other is essential.
4 The importance of models. To express and communicate what you do. We need good, transferable examples. The foundations of communication, as argued by the gurus of green marketing, are transparency and truth. Common sense!
5 Because creativity and beauty can work wonders. Carriers of content, facilitators of change. Humanism and sustainability are closely related.
6 + Life Cycle Design – CO2. It means 'more conscious design, less environmental impact' – the social and environmental responsibility of design are the two routes of sustainable living. 'The development model based on consumerism has reached the tipping point. A real cultural paradigm shift must take place and accompany the search for technical and scientific solutions.' (State of the World 2010 / Worldwatch Institute)
7 Step by step. This is the method. A step-by-step method that can be adopted for any long or short paths. You start from where you are and you set one goal at a time; gradually, here and now. You just need to start.
8 The right direction: without this, we won't go anywhere. We need a horizon of happiness guiding us. A common goal that unites genres, ethnicities, subject-matters and knowledge. Thousands of forms, ideas, colours, actions are possible, provided they are functional to a wonderful harmony between personal well-being and the common good. Who can even think of still being happy at the expense of someone else's happiness?
9 The firms of the future, according to Ezio Manzini, '…are those that generate positiveness'. Entities that build up that sustainable economy which has its strength in 'the capital of relationships'.
10 Women and Participation. It is commonly believed (for instance by the World Bank) that the most effective way to fight poverty is to help women. Caretaking skills, relational networks, closeness to real life; the qualities of women are to be recognized and exploited.
11 Little is needed. We often say that there are many things we need to start taking action: a lot of money, a lot of technology, many difficulties, so much of everything. Just try it; this is not always the case.

From Best Up's Manifesto (Salone del Mobile 2010 and 'Domus' November 2010)

The initiatives of BEST UP have been selected as one of the cases by the European C2C Network.

Campaign + LCD – CO2: More Lifecycle Design – Environmental Impact

- 2008 Edition '+Life Cycle Design – CO2: how far have you got?'
  The campaign was dedicated to designers, schools, businesses, institutions, and focused on the adoption of Life Cycle Design, a method that takes into account the environmental load associated with the entire life cycle of products to reduce environmental pollution. 'How far have you got?' hinted at the fact that companies and the design world needed to begin to adopt the LCD, taking social responsibility for their actions and committing themselves to improvement.
- 2009 edition '+Life Cycle Design – CO2: the environmental and social responsibility of design'
  The campaign aimed at promoting conscious and socially responsible design. It highlighted, in particular, the combination of the environmental and social responsibility of design, stating that the 'eco-efficiency of processes, products and services is valid only if rooted in a society based on social justice'.

- 2010 edition '+Life Cycle Design – CO2: from just saying to actually doing something What to do?' The need to act, responsibly, but nonetheless to act was proclaimed. Best Up confirmed its vocation to be helpful, providing information and food for thought, identifying tools and models, creating synergies and meetings. It provided specific contributions in education, green marketing, communication and sales, Made in Italy values, and corporate social responsibility. It indicated excellent models that, with their practices, provided useful information to all.

Step by step exhibition
An exhibition created to:
- enhance examples of companies and entities providing responsible solutions to society and the environment.
- promote transparent communication through identity charts based on the lifecycle of products and services.
- propose the Step by Step method based on identifying declared and progressive goals.
- show many different facets of sustainable living: eco-efficient products and materials; conscious lifestyles; well-being models that harmonise private needs and the common good; industrial and traditional processes with a positive impact on the territory; innovations from research; training and good practices. At the same time, the exhibition aimed to build up relationships and to make people involved in 'sustainable living' come together and meet, people, from architects and designers to entrepreneurs, from associations and consortia to students to the general public thirsting for information.

Database of the circuit for the promotion of sustainable living
The circuit was born to foster dialogue between the different subjects in the field, emphasising production and research in a sustainable way by adopting the logic of the Life Cycle Design (based on the life cycle). The Database aims to become a tool to be used to develop the 'sustainable Made in Italy' system, involving distribution and production companies, institutional bodies, research and training entities located in the territory. It is a wealth of excellent examples to be inspired by.

Lcd (life cycle design) – the social and environmental responsibility of design: a new symbol for all
The use of the graphic symbol as a simple and universal language was the commitment to synthesis and creativity expressed in the workshop 'Lifecycle design: a new symbol. A symbol for all' organized by Best Up at the Faculty of Design of the Polytechnic School, Milan.
Two basic principles were at the heart of the workshop and of its interventions, which introduced students to the various facets of sustainability (from more technological ones to more humanistic ones). The first was the eco-efficiency of processes, products and services that is valid only if rooted in a society based on social justice and respect for all living beings and the Earth. The second was the idea of putting responsible and conscious projects at the heart of operations.

Towards the sustainable store
In 2010, Best Up collaborated with Innova.com and Federmobili to establish a system to promote sustainable practices at furniture stores (from their management and building structure to their CSR, offer of products and services, etc.).

Interview with Sharn Sandor

Sharn Sandor is a recent graduate of the London College of Fashion, where she completed an MA in Fashion and the Environment, and she has more than 10 years' experience in the fashion industry – first in the United States and more recently in the Netherlands and London.
Conducted by Milano Metropoli

Companies in the textile/fashion industry should adopt sustainable principles because this can improve not only their image, but they can become more cost-effective with increased profits, improved relationships with all members of the supply chain and new opportunities presenting themselves. There are numerous ways that a company can instigate sustainable changes. It is not an easy task, however, and requires the entire design chain to initiate sustainable changes. As Kate Fletcher states, it is a 'joint responsibility'. The important thing to do is to try and find out how sustainable design practices can be strategically implemented. Is it the responsibility of the designer, the sourcing agent, the fabric mill, or the CEO? Perhaps the paramount way to excite main-stream designers, developers, agents, and management is to start by showing how their decisions affect the supply chain, people and the planet. Sportswear designer, Piers Thomas always looks to the supply chain when designing technical sportswear. Piers feels that sustainability is already similar to technical apparel because it is problem-solving orientated. Piers feels that while designing sustainably, one needs to 'look at opportunities rather than challenges'. Surely, if someone were to see that they could use organic cotton and eliminate or reduce chemical use and make farmers' lives better, they would try their hardest to do so. Alex McIntosh, Business Support Manager at the Centre for Sustainable Fashion (CSF) at the London College of Fashion, feels that one cannot grow or change something unless it is personal.

'I would never say to a business you need to go and change the materials you are using or something. You need to actually decide what means something to you. Think about how you communicate that back to your consumer. That can be anything. That can just be taking a different view of your product. This is not just something I sell; this is about me. How my clothes express who I am and what I care about." – Alex McIntosh, CSF.

Peter McLaughlin is a high-end mass-market designer and feels that it is not his responsibility to think about the environmental impacts his decisions have as a designer. He says that this is up to the sourcing and development teams and he feels the need to focus primarily on the aesthetic of the garment when creating an entire collection. The sourcing manager should then present options to his brief that may or may not be eco-friendly. If they were to show some great eco-options, he would surely be inclined to use them. He notes the work of Stella McCartney, for whom the design and aesthetic comes first. Of McCartney, Peter says: 'The green thing is a bonus, the cherry on top. Interesting because it's not fully green but the vast majority is.' Peter feels that a designer needs to design and that one should not 'hinder the design process with limitations'. McLaughlin thinks that, especially in larger organisations, it should not be up to the designer to look into eco-alternative materials.

Others think that the way to initiate change in the current methods of manufacturing is by using fresh, innovative new textiles that are sustainable – and most importantly – look great. The perceived problem is that ethical materials are not always thought of as 'cool' or innovative. While an ethical sportswear designer will research and develop materials that are made under sustainable methods that have a paramount function, Massimo Bardazzi, fabric designer for Burberry, also uses highly technical fabrics that are made from recycled materials. Burberry uses them because they look 'cool,' and have the function desired, and not necessarily because they are eco-fabrics – 'that's an added bonus.'

Fabric, in particular, needs to be aggressively addressed for any proposed design modifications. The choice of fabric involves virtually all key areas of business production, including the development team in the home office and the garment factory, as well as the merchandising and marketing teams. If the fabric itself is made by innovative and sustainable methods, and can then perform a specific function, that can then be used as a marketing tool for a public that is itself increasingly aware of sustainable issues. For instance, both Marc Jacobs and Patagonia use recycled ripstop materials. However, Marc Jacobs focuses on the garment's function and aesthetic, but does not market the jacket's sustainable features, while Patagonia markets the garment for both its function and sustainability. One does not always need to focus on a garment's sustainability as a marketing tool, yet can still use best-practice standards where sustainability is concerned. It is a matter of both practice and principle, whether one chooses to emphasise a garment's sustainable attributes, and remains dependent on that particular brand's identity.

While there is a growing awareness of the need for sustainable alternatives in the fashion industry, and changes are already being implemented to address sustainable issues, there is also a need for a more systematic approach that offers realistic solutions to bring about meaningful change in the design process. Although upper-level management has to initiate and support change, they also need guidance to give their staff direction, offering both short and long-term goals, as well as access to up-to-date information and innovations relating to sustainable practice. One possible solution for companies is to develop a small 'sustainable' department with a coordinator who is aware of the advantages and limitations of sustainable alternatives, who can then liaise between management, design, product development and factory liaison offices overseas. The sustainability coordinator could not only help management develop short and long-term goals, but could also support the design process by disseminating information and contacts that can lead to collaborative efforts both internally and externally. This person can ultimately synthesise the environmental, social and economic aspects of the business model.

Many, no matter who they are designing or sourcing for, feel there is a lot of finger pointing but this kind of direction ultimately needs to come from upper management through support and incentives. To initiate change, upper management needs to take a committed stand and truly want to change the way their company operates. For people to really make changes there could to be personal incentives based on one's performance and a bonus in order to achieve the change needed within a large organisation. In the end, sustainable design could be used as a selling tool which involves sourcing, sales, etc. It is all about upper management and cost effectiveness.

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Interview with Silvia Marastoni

Silvia Marastoni is an expert in sustainable textiles/fashion and co-manager of the Critical Fashion Cultural Project, part of "Fa' la cosa giusta", the critical consumption trade show.
Interview by Arianna Chieli

Ethical fashion

The development of ethical fashion is a challenge taken on by the many subjects, circuits and networks – whether they be formal or informal – involved in experimentation and research, production and distribution, purchase and exchange that are now multiplying in Italy too. I believe that the participation in the Critical Fashion Conference of representatives of the Chambers of Commerce of Prato, Biella, Como, as well as of the Manager of CNA-Federmoda and of the National General Secretariat of FILTEA-CGIL is very significant.

A niche experience

However, ethical fashion still seems to be a challenge that fails to persuade and truly involve (other than just partially and marginally), many of the key players of our textile/fashion system regard it as a market that is bound to remain a niche market.

In fact, although the number of projects and products of this kind created by fashion designers and clothing brands is on the rise, these initiatives are still marginal ones and are often limited, being mostly focused on certain aspects only: the use of eco-friendly raw materials (especially organic cotton), charity (i.e. products whose proceeds are partly devoted to projects of NGOs, humanitarian organisations, etc.), and the reduction of the environmental impact of production processes.

Limits

Some recent examples of this approach are: H&M's Garden Collection (which uses organic cotton, flax grown without using toxic substances, recycled polyester and tensel – a renewable fibre with little impact on the environment), or the Earthkeepers line by Timberland, in organic canvas and with 100% recyclable uppers and soles, which allocates € 2 to the Yalé Haiti Foundation for each pair of boots sold; or even the underwear brand Yamamay, which promotes a special line in organic cotton and an eco bag and has reduced greenhouse gas emissions related to its production and supports WWF projects. All these are praiseworthy initiatives, but they fail to deal with and nearly always ignore other crucial issues, such as the very important one of the working conditions (especially in the southern hemisphere), of an industry that is highly delocalised and globalised, which has been the object of much pressure and many campaigns, such as those of the Clean Clothes Campaign.

What is ethical fashion?

Ethical fashion, in fact, means much more than focusing on raw materials and manufacturing processes, on recycling and reuse; it also means reducing the impact of distribution, enhancing knowledge and local traditions, guaranteeing real transparency, traceability and certification of supply chains, respecting workers' rights. Without forgetting the issues related to the logic of the extremely rapid, planned obsolescence that characterises supply, and that encourages exaggerated consumption on the demand side.

To produce, distribute and consume ethical fashion means for us to view, in a completely different way, the concrete and symbolic value of clothing, and to look for new options for a productive industry of excellence and of great importance in our country (which is, however, one of the industries most badly hit by the recent recession, with serious repercussions on employment too) and within the 'global system' of textiles/fashion. It is a long and complex process, which I hope will involve more and more actors and realities – at all levels – even in Italy.

Views from Carlo Petrini

Carlo Petrini is founder and president of the Slow Food International Association. He is also the founder and tireless promoter of major events such as 'Salone del Gusto', 'Terra Madre' and 'Cheese'. The first University of Gastronomic Sciences was developed from his ideas. In his book 'Buono, pulito e giusto – Principi di nuova gastronomia', published by Einaudi in 2005, he defined the concept of 'eco-gastronomy'. The book has been translated into English, French, Spanish, German, Polish, Japanese and Korean.

Dialogue between Petrini and Rifkin

'I find there are extraordinary similarities and parallels between the new energy policy that you (Petrini addresses Rifkin) are promoting and the new food policy that we are fostering with Slow Food ....the first two ideas that we have in common are the rejection of overly centralised systems and a return to a holistic conception of our existence on this planet'.

'I believe that the past should not be forgotten. For example, we need to return to what used to be the approach of farmers when they became aware of their land and planned their crops. They studied the land carefully and determined where it was best to grow a vegetable garden; maybe they would raise hens behind the farm, where it was more shady. Or rather, the hens would be taken to the plantations to fertilise different parts of the ground with other livestock; and in the area most exposed to the sun, grapevines would be planted. It was a vision that was grounded on a complex approach, which paid attention to interconnections, thus obtaining the greatest efficiency from the surrounding environment without compromising it. Men worked with Nature'.

'To mistake the price of food for its value has destroyed our soul. If food is a commodity, it doesn't matter if I waste it. In a consumer society, everything is thrown away and everything can be replaced or rather, everything must be replaced. But food does not work that way. From an educational point of view, the work to be done is immense: not only do we have to pursue a policy of opposition to those who govern the system; we also have to pursue a policy fostering individual change'.
Taken from 'Dialogo sulla natura fra Rifkin e Petrin' Repubblica, June 9, 2010

Looting creation
'An environment that is ill will make people ill as well. And humanity, at this moment, already has enough reasons for suffering. If humanity must take charge of an increasingly depleted environment, it runs the risk of living in an unwelcoming house. In respect of these issues, the last century was characterised by an accentuated looting of creation. So much so that many have begun to argue that we have reached the tipping point for reconstructing the harmony between our metabolism and that of the Earth. Those who have most exploited environmental resources do not understand that they must put an end to their greed; those who have received less will not tolerate limits. This huge effort of contraction and convergence, required of all, cannot find a balance'.
Taken from DIBATTITO/Petrini (Slow Food) 'As an agnostic, I agree with the Pope on the environment'

Slow food and pleasure
'Slow Food began as – and still is – a "movement for the protection of and the right to pleasure". Quite obviously, its name indicates a reaction to fast food, but it is not just about eating, although that remains a central issue: it is a criticism of the exaggerated speed of our times that makes us lose our relationship with nature and the environment, through food, and more generally with what we are. This speed is the expression of consumerism, in which not only do we consume objects and food with no history and taste, but we also literally consume the earth that we walk on and the air we breathe through methods of production and lifestyles that are highly unsustainable. The protection of pleasure in this scenario becomes crucial because it means to demand a better quality of life for all, to regain taste and what is beautiful, things that are physiological and concern everyone, from the richest to the poorest. This implies returning to sustainable practices, which does not mean making sacrifices or living without satisfaction. Sustainability is no humiliation, sustainability is the rediscovery of the pleasure of living in harmony with what surrounds us'.

'We are not the masters of Nature, we are an integral part of Nature, we are in it, and everything we do has serious consequences for it. This illusion has made us forget that today's crises – climatic, ecological, financial, economic, food crises – are only the beginning of a tremendous process... if we do not change the way we live, the future will be very bleak'.

'By choosing what we eat we orientate towards clean agriculture. Wendell Berry, the Kentucky farmer-poet, rightly reminds us that "eating is an agricultural act". By choosing fresh, local and seasonal food, we do ourselves a favour because it will certainly be tastier, but we also do the Earth a favour too, no longer plundering it and stressing it beyond the limits that allow for its regeneration. It would do us good to consider investing a bit more in the food we put in our bellies; industrial food costs too little today, and this has repercussions for wrong and unsustainable production and distribution practices'.
Taken from www.finanzaediritto.it/articoli/intervista-a-carlo-petrini

Why does hunger exist?
'According to FAO, we produce food for twelve billion people, while there are now six billion eight hundred million human beings, of whom one billion are malnourished with many even dying of hunger, and one billion seven hundred million suffer from hyper malnutrition, that is diseases caused by excessive and bad eating. So it's not a question of food shortage, rather of a society that is deeply flawed, unfair and unethical, which considers men not as "beings" but rather as consumers that, in order to produce all that food, subject the Earth to treatments that deplete it and cause tremendous damage'.

'The overproduction of food – rather than industry or warming or cars – is primarily responsible for environmental disaster, for the destruction of ecosystems, biodiversity and soil fertility, for aquifer pollution and water shortage, and for much, much more. This is because the consumer society is based on three elements without which it would collapse: speed, which prompts consumption and constant changes; the induction of unnecessary needs, and thirdly – and most worryingly – waste. We buy unnecessary

things, always new, always different, and then throw them away; the "all readily available" market justified by lack of time is more and more flourishing, while we've never had so much time available as today. Let me give you a trivial example, that of pre-washed salads sold in plastic bags: they cost a fortune and their quality is questionable, yet to wash a salad only takes a couple of minutes. We must learn again not only to wash salads, but also to rediscover home food production, starting from preserves, which now seem to belong to a bygone era. Thus we must direct ourselves towards food, not for the time and money that it saves us, but for its value and goodness'.
Taken from www.cucina-aturale.it/section/article/carlo_petrini_il_paladino_del_buono_pulito_e_giusto

Food and waste
'Agriculture is the only human activity based on photosynthesis. In concrete terms, what can we do to avoid waste? The first appropriate action to take is to support farmers, whose number has fallen to less than 3% of the population in Italy. How? By buying food from them, from the farmers' markets, or through ethical purchasing groups. We need to start from home refrigerators, learning to buy wisely, teaching ourselves not to waste. If we do not give value to food, but only to its price, we will end up ourselves being eaten by food, because we will become a component of the perverse mechanism of the food industry, which no longer produces food to eat, rather to sell. Food eats us because it eats the Earth, its resources, its ability to renew itself. The system that has been built around food has changed its value: money is the measure of happiness'.
Taken from: Petrini_ "Si spreca una montagna di cibo" http://www.europass.parma.it

Views from Oscar Farinetti

Oscar Farinetti read Economics in Turin and then immediately joined the family business. From 1978 to 2003, he was first Director and then CEO and Chairman of the household appliances group UniEuro. From 2002 to July 2003, he was a member of the Board of Dixons, the British multinational company, and at the same time collaborated on educational activities for the Cermes-Bocconi Institute and for the University of Parma. After creating Eataly, the first supermarket in the world devoted entirely to high-quality food, which opened on January 27, 2007 in Turin, in September 2008 he stepped down as CEO while still remaining as Chairman. Meanwhile, he took care of the opening of new Eataly supermarkets: in Milan (October 2007), Tokyo (September 2008), Bologna (in partnership with librerie.coop; December 2008), while in autumn 2009 he opened Eataly in New York. Since July 2008, he has been CEO of the Fontanafredda winery.

The importance of food
'Petrini taught me how to have a different relationship with food; he was the first person to make me realise that food is the only consumer product that we put into our body and not outside and that, therefore, it is much more important than any other product. He made me realise that behind food there is a world of culture, traditions, values, which ultimately is political. He made me understand that there is this crazy system whereby the only entrepreneur who cannot create his own price list, who cannot set the price, is the farmer, yet he is the only entrepreneur who produces the most important asset of humanity, the one that we put into our body. Despite this, he cannot set the price of the products he grows and this is done by others, the markets. Just think: what kind of producer is someone who creates goods without knowing at what price he will sell them? It's terrible. He made me aware of these things. I have this entrepreneurial spirit, this business spirit and I have tried to put these ideas into practice'.

Zero km products
'We should eat seasonal products. We would then solve so many environmental, logistical and other problems and we would enjoy food more as it would be better food as well. Second, we should try to eat local, seasonal produce; it is fresher, it travels less far and this solves problems, especially as far as fruit and vegetables are concerned in Italy, a country which is well covered. The products with the best guarantees dominate. There is a minimum amount of packaging so as to prevent waste and this is extremely colourful. We should pay attention, wherever possible, to the kilometres travelled by goods, which should be as few as possible'.
Interview http://www.wuz.it/intervista-libro/2642/oscar-farinetti-eataly-mercante-utopie.html

What is Eataly?
Eataly (in Lingotto – Turin) covers 11,000 square metres, reserved for HIGH-QUALITY FOOD AT SUSTAINABLE PRICES, as the slogan goes. Visitors choose meat, pasta, olive oil, tomatoes, cheese. They hold packs in their hands that they have never seen before in any other supermarket, brands that do not end up on TV. They touch disposable plates that are not made of plastic or paper, but rather of palm leaves, while breathing in the country scent of fresh bread made with organic flour and natural yeast, which Farinetti is as proud of as his own child.
Taken from the book Il mercante di utopie. La storia di Oscar Farinetti, l'inventore di Eataly by Anna Sartorio

The importance of conscious consumption
'The statement of Wendell Berry, the Kentucky farmer and intellectual, that dominates the entrance to Eataly – "The first agricultural act is performed by the consumer by choosing what to eat" – is the very principle of the change with which Eataly identifies itself. The consumer is slowly understanding that he can become 'a co-producer' and thus affect market supply. If we all ate seasonal and local produce, we would limit, for example, truck traffic.

Sustainable packaging
'Let's ask our suppliers to make biodegradable packaging. We use bags and packaging in Mater-Bi; our goal is to avoid creating waste in our stores'.
www.gdoweek.it/articoli/0,1254,44_ART_1286,00.html

The zero-residue campaign
'At the Fontanafredda winery, I deal more with the agricultural part of the business. And I want to win a challenge here: that of clean wine, produced without herbicides and chemical fertilizers in the country, with a zero-residue harvest. In two years of work we have achieved this goal, but now I want to clean up the cellar: to eliminate sulphites and use self-produced, autochthonous yeast'.
www.cronachedigusto.it/component/content/article/193-numero-153-del-18022010/4245-lintervista-qvi-racconto-ilsuccesso-di-eatalyq.html

The Cradle to Cradle Network (C2CN) is an Interreg IV C capitalisation project consisting of ten partners from ten European regions which aims to reduce raw materials' utilisation, to generate less waste and less environmental pollution, as well as to enhance innovation and economic development.

Province of Limburg (NL)
www.limburg.nl

Flemish Public Waste Agency (BE)
www.ovam.be

Milano Metropoli Development Agency (IT)
www.milanomet.it

Department for Economics and Tourist Development of the City of Graz (AT)
www.wirtschaft.graz.at

ARDI Regional Agency for Development and Innovation (FR)
www.ardi-rhonealpes.fr

Kainuun Etu Ltd (FI)
www.kainuunetu.fi

West-Transdanubian Regional Development Agency (HU)
www.westpa.hu

Suffolk County Council (UK)
www.suffolk.gov.uk

North-East Regional Development Agency (RO)
www.adrnordest.ro

Government Office for Development and European Affairs (SI)
www.svrez.gov.si

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