Make the environment the (Next) Economy.

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Abstract: How can designers make people get in touch with sustainable development? “km -1: make the environment the (Next) Economy” is an experimental study that explores the characteristics of the “Next Economy” (Manzini, 2011). First: it’s a social economy. Second: it’s strongly linked to the ongoing dynamics of social innovation, emerging from the grassroots. Third: its aim is the production of goal-specific systems. The study combines two ambits which have had few chances to communicate: community centered design and material driven design, aiming to define new scenarios regarding the relationships among local communities, urban spaces, waste and meanings. The author has worked within the specific framework of urban convivial gardens, which become the space of social innovation, using the Material Driven Design Method (Karana, Barati, Rognoli, Zeeuw van der Laan, 2015). The study explores the opportunity to transform bio-waste into a do-it-yourself material which can be used inside the gardens.

Keywords: Environment, Community Centered Design, Material Driven Design

1. Framework

1.1 The Next Economy

The Earth Overshoot Day for 2016 was reached on August, 16th (overshootday.org). The Overshoot Day is the day which marks the environmental bankrupt, the date from which humanity starts to “use more from nature than the planet can renew in the whole year”. This resources debt is attributable to economic systems which are poorly oriented towards eco-sustainability.

Starting from 2008, these financial-economic models have been suffering an unpredictable crisis, which influences millions of people, increasing the amount of people living below the poverty threshold. Alongside the economy of the twentieth century, a new kind of economy is developing, an economy of the twentyfirst century. The latter is oriented towards ecosustainable models of production and consumption, trying to enhance their eco-efficiency and social production of services. In this way it satisfies new needs and promotes social cohesion and a new territorial
ecology, encouraging biological and socio-cultural system’s variety. This economy represents what Manzini (2011) calls “Next Economy”. The Next Economy is distinctly characterized by some factors: it’s a social economy, because “the problems to be dealt with calls a variety of actors into play (...) each of these is driven by a different mix of motivations within the framework of a complex economy” (Manzini, 2011). It’s strongly linked to the outgoing dynamics of social innovation, which emerges from the grassroots – especially when people need to re-invent themselves because of an economic crisis - and tends to further develop thanks to social media networks. The Next Economy doesn’t produce material goods, but aims to produce systems capable of satisfying a specific objective. These systems are usually a chain of technical and social services.

Designers have to deal with a framework where complexity has increased and they are not requested to “design something”, but “design for something”. The object of the project is not just a material good, but a “platform for action”, where the human component is fundamental for the development and execution of these processes. The human component could be considered for singular people, which is the dominant approach nowadays, or for small communities, which holds the abilities to conceive, perform and manage new services. The designer isn’t the only personality capable of designing anymore, they become a social innovation’s facilitator, who joins the citizens in tangible and intangible spaces where the conversation happens freely (Manzini, 2014).

The Next Economy’s design culture develops on a local level through communities, and reflects on a global social change through a society open to design thinking. The Next Economy’s designer works within the Community Centered Design (CCD) framework.

1.2 Community Centered Design – CCD

CCD is an extension of the User Centered Design (UCD): both of them put their attention on the user, but they use different scales and tools to interact with people. (Cantù, Corubolo & Simeone, 2012). CCD focuses on the community’s needs. Designers using CCD own abilities which help them working on a bigger scale, such as co-design: it would be impossible to be a social innovation facilitator without involving and be involved by the creative communities.

Co-design processes represent a strategic conversation among different partners: the designer contributes by motivating and feeding it, producing project-oriented knowledge through co-design activities, which results in a process of co-construction.

The author decided to use a CCD approach and has worked along CampUS project.

CampUS (www.progettocampus.polimi.it) is an interdisciplinary project developed by the Design Department, the Architecture and Engineering management Departments at the Politecnico di Milano, Italy. The project aims to use the university campus as an incubator for social practices addressed to neet and Over75, that are then transferred into the neighborhood as independent actions. Among CampUS’ social actions, the author has worked within the specific framework of urban convivial gardens, which become the space of social innovation, where the people involved in the gardens’ management are integral part of the development, testing and activation of the innovative activities. These gardens are: “Coltivando – l’orto conviviale al Politecnico di Milano” (Coltivando – the convivial garden at Politecnico di Milano) and the Convivial Garden in Cascina de’ Prati Street.
1.3 Material Driven Design – MDD

Everybody looks to the matter in a different way, based on their experiences and their knowledge—a man of science sees the matter differently from an engineer, a designer, a cook. Since the matter is perceived and experienced differently, it’s important to introduce the concept of “material experience” in the traditional anthology. Artifacts inevitably carry an expressive meaning linked to human perception: materials included in a product don’t only confer a performance, but are the main medium of sensory and emotional experiences. Therefore, meanings are born from space-relational references: they refer to the body’s role for understanding the world and to human-made concepts to describe humans’ interrelation with reality. They may be universal when they are not susceptible to technological advances or changes within the socio-cultural patterns; or acquired when they are tied to their context of use.

Today the "recognizability" factor comes into crisis because of the new materials developed by the techno-science. Since the meaning conveyed by a material is important for the user, it is necessary to design all its qualities, not just in terms of performance, but also in terms of soft qualities. It’s necessary to go from the design of product experience to the design of material experience.

The material experience can be defined as the series of effects induced by the interaction between materials and users in a particular context (Karana, 2010).

Currently, there are three types of material experience:

- enhancement of imperfection as a design strategy
- development of dynamic materials that change over time. They are both smart band growing materials, which are cultivated as if they were living organisms
- self-production, self-design, do-it-yourself (DIY) materials

DIY materials are innovative materials resulting from a process or from an individual or collective experience of self-production, characterized by:

- design of a new material or redesign of an existing material
- self-production of a new material by the designer, through the process’ direct control.

The development of DIY materials is thus distinguished by a direct integration between the design and the production phases and by its independence from industrial processes.

These materials are characterized by a wabi-sabi aesthetics: unnecessary embellishments are avoided, the concept of precious doesn’t exist, and the beauty is a dynamic event that occurs between man and something else. It’s the language of everyday life, characterized by the signs left by time.

Matter owns two fundamental roles in the project: providing technical characteristics and performance, and giving personality to a product due to its aesthetics (Ashby & Johnson, 2002; Manzini, 1986). The design area that considers the material as the main point of departure in a project is called Material Driven Design (MDD), whose main areas of interest are: the user experience, environmental sustainability and technology. The achievement of environmental sustainability addresses not only the question of sustainable waste disposal, but also the possible scenarios of use of the waste.

Nowadays the main scenario is the Upcycling: materials are limited and possess limited life cycles. The designed re-use at the end of the life cycle postpone by a few months the arrival to the landfill. McDonough and Braungart (2002) call "Cradle to cradle" the scenario where materials would still be
limited, but their life cycles are unlimited. Materials would never lose their value and would be
designed in order to be recycled infinitely.
The goal of a more distant future comprise the scenario in which we design for material ecologies.
(Goldsworthy, 2014) Materials are unlimited, as well as their life cycles and the system includes all
the resources, products and by-products.

In the last decade, in parallel to mass production’s technological advances, another approach has
emerged, creating a new relationship between designers, technologies, production processes and
materials. It combines making, crafting and personal fabrication (Gershenfeld, 2005; Kuznetsov,
Paulos, 2010; Tanenbaum et al., 2013). Design, self-production and advanced digital manufacturing
technologies meet in advanced forms of DIY practices known as the "DIY Third Wave ", whose output
are new materials that give emphasis to an autonomous and independent production of materials,
which can be the mean for obtaining meaningful and customizable material experiences (Karana et
al, 2008; Karana et al., 2015).

DIY materials are any new material resulting from a process of individual or collective experience of
self-production. The design of DIY materials is influenced by "learning by doing" and "learning by
interacting". Designers express themselves through making, creating unique materials and products
that reveal their personal touch, manifested through imperfect surfaces, attributable to the unique
self-production process. On an emotional level, DIY materials facilitate the users’ attachment
because of their self-produced nature or because of the surprise generated by the fact that it is not
expected that the material results from the processing of waste.

The approach in the design and the production of DIY materials is often naive, free from structured
preconceptions, characterized by reduced economic investments and from on-demand production of
small amounts of material in situ. The opening of the design and production processes can create
endless variations and minor improvements of the same material. It becomes all the more
interesting as the number of people who investigate this new material world increases. This scenario
delivers a fertile field in which to explore the relationships between DIY materials and social
innovation (Murray, Caulier-Grice & Mulgan, 2010).

How can CCD and MDD talk to each other? How can they help people get in touch with the Next
Economy models?

2. Goals
One suggestion arised from the observation of Bovisasca’s and Coltivando’s community gardens:
they are sustainable systems, that, however, yield "waste." Currently, "waste" is thrown in a compost
bin. Could this green material take on a new value and meaning, be enhanced, and help the gardens
communities?
Federalimentare (the Italian food industry federation) does not consider food waste as garbage, but
as a by-product, identifying it as an economic opportunity for the industry itself. The by-products of a
community garden look attractive for a design project and experimentation. A material is seen as an
opportunity and triggers the project: it’s considered as the starting point for the design of artifacts
useful to the garden community itself.
"km-1" is an exploration and a co-design-led project of a DIY material and its meaning within two
creative community in Milan, Italy. One of the goals is the integration of some tools of MDD with
others of CCD, which is expressed by the definition of scenarios related to the meaning of this new material. "km-1" is a project that aims to put people in touch with the reality of the materials through their manipulation and tinkering, bringing a community to a more human and direct relationship with the materials in this precise historical, socio-cultural and economic period. “km-1” highlights the possibility of making communities aware of the potential of DIY materials and making them create new kinds of bottom-up economy nurturing from nature.

3. Method

How is it possible, in such a complex context, to be able to give an identity to materials? DIY materials can be an answer: since they are manufactured, they offer a new and pleasant material experience, as well as the surprise effect they have on people who come into contact with them. But how to design a DIY material? Which model to follow?

Four designers and researchers - Elvin Karana, Anouk Zeeuw van der Laan and Bahareh Barati of the Department of Design Engineering of TU Delft and Valentina Rognoli of the Department of Design of Politecnico di Milano - have formalized a model that can attribute value to new materials in a faster way. The aim is exploring and understanding a material in order to develop a unique user experience associated with it, planning applications, concepts and opportunities. This method has been called "Material Driven Design Method" (MDD Method) (Karana, et al., 2015)

The starting point of the experimentation is the choice of a material, considered more as a "departure recipe" for the application of the MDD Method.

The chosen material was Grow It Yourself Mushroom® Material by Ecovative (http://www.ecovaticedesign.com/), which is a material made from agricultural byproducts and fungi’s mycelium. This material may be classified as a high performance bio-composite created by natural, humble and rough materials. Finally, it’s necessary to cook the molded material in order to stop the fungi’s growth.

It allows do-it-yourself processings, plus the ability to modify and experiment its basic recipe. It’s totally natural, biodegradable, compostable, and absolutely non-toxic.

The material is distributed in a kit: once the mycelium, the fungi’s vegetative part, contained in it has been reactivated, the forming process is very simple and inexpensive. The mycelium is reactivated by the addition of water and flour in the kit bag. The material is then allowed to rest in a dark, dry place for 3 or 4 days. Then, the material is extracted from the envelope, crumbled and poured into molds. After about a week, the material has taken the shape of the mold in which it is inserted by growing and digesting the natural fibers in the mold, and acts as a glue among the fibers, compacting the whole mass.

This material was chosen because it falls within all three emerging material experiences and was considered the best one to be able to express its own characteristics within the gardens’ context.

The MDD Method follows four steps:

- Step 1:
  1. understanding of the material through tinkering and studying its literature, in order to get a picture of what has remained constant, and which values, meanings and experiences have changed
2. technical characterization through a material benchmarking
3. experiential characterization through user studies

At the end of this phase, the designer should begin to get an idea of what could be the applications of the material.

- Step 2: Create a material experience vision

Starting from the results of phase 1, data are organized in such a way that their relationships among each other can be found. Once these interrelationships are identified, it is necessary cluster them in order to obtain eccentric observations concerning the perception of the material. And finally it’s necessary to produce a statement containing a metaphor showing the desired interaction between the user and material.

- Step 3: Manifesting Materials Experience Patterns

Starting from the vision, brainstorming is useful in order to define some meanings to be analyzed. From these meanings it is possible to reach the formal and technical features through user studies, intuition or semantic search. The user studies can be carried out with the support of several tools: Meaning Driven Materials Selection (MDMS) (Karana, 2010), the Meanings of Materials Model (MoM) (Karana, 2009), mood boards, material boards... The features are organized into patterns.

- Step 4: Designing material/product concepts

In this phase, the designer integrates all his findings in a classic process of product or material design.

"Km-1" implements only the first two phases of MDD Method within the framework of the garden communities with a view to co-design. Through the construction of scenarios and visions for the future, a community is able to promote encounters between people who want to work together (Manzini, 2015). The scenario in this sense is seen as a communicative artifact, which more efficiently supports a process of co-design. One of the tools for social conversation between the different actors in a collaborative organization is the workshop, where people use toolkits designed specifically for that specific socio-spatial context. In this way, people, places, and tools create places for experimentation, which are a breeding ground for self-construction, self-production and, in general, prototyping of social innovation actions.

The MDD method and the CCD methods (workshops and toolkits) meet in order to create new scenarios for the use of the material. "km-1" is an experimental study where the first two phases of the MDD Method were developed through three workshops:

- “MDD concept lab”
- “1,2,3 Coltivando”
- “C’è orto per tutti” (There’s a vegetable garden for anyone)

During the workshops different toolkits were used, all including:

- Material’s samples
- Surveys regarding the exploration of the material. They were necessary to perform the phase 1 of the MDD Method’s user studies. These questionnaires can accompany users’ sensorial exploration of some samples of material through the senses (in the
order: sight, smell, hearing, touch) trying to isolate the action of a sense at a time, so that results aren’t biased. The questionnaires use scales of values and open questions. The explorations ends with questions regarding the assumptions related to the material family, its life cycle, and the identification of perceived meanings.

• **MDD CONCEPT LAB**

A workshop was held within Professor Rognoli’s course "Material Driven Design" with MSc students in Product Design for Innovation. During the workshop, which lasted two classes, students had the opportunity to interface for the first time with a DIY material and the MDD Method. They carried out steps 1, 2 and 4 of the method in this way we could get an overview of how the "design experts" perceive the material and conduct an investigation on possible scenarios offered by the material. The results were collected and analyzed, and then compared with two other types of target, whose data were collected in subsequent workshops.

• **1,2,3 Coltivando**

On the occasion of the third birthday of Coltivando a day of activities involving gardeners and neighborhood’s citizens was organized. Among other activities, a material exploration workshop was arranged. This workshop explored the steps 1 and 4 of the method, therefore, tinkering with the material and concept development. For the workshops were created: a small installation, which described the material, a toolkit consisting of material samples, questionnaires, sheets for tips and concept drawings. Moreover, processing sessions starting from the Ecovative kit were carried out. Participants were able to take home samples created by themselves, in order to cook them later, experiencing firsthand the desired material experience.

• **C’è orto per tutti (There’s a vegetable garden for anyone)**

The last two workshops were held at the Associations House of the neighborhood, not far from one of the gardens. The workshops, as well as serving as teambuilding activities, have served to explore again the material and to make further user studies on the perception of the material. The obtained results would be compared with the other acquired by the previous workshops. Participants were also required to propose a concept to be placed inside a map of the garden. On this occasion there was another work session to shape the material.

### 4. Results

The outputs of the workshops were very different, depending on the people involved.

During MDD’s step 1, people could experience the material (Figures 1-2), make it and propose a list of materials that felt similar using different senses (i.e. doing a benchmarking) (Figure 3).
Figure 1. Tinkering with the material.
At the end of this step, the participants to the workshops raised a number of meanings which they found suitable for the material, including:

- ecological
- natural
- poor
- attractive
- nostalgic
- healthy
- innovative
- humble
- beautiful
- imperfect
- weak
- economic
- poetic
- cozy.
The collected data are reorganized highlighting their relationships and then clustered (Figure 4).
Main identified clusters:

- Imperfect beauty
- Care-comfort
- Welcome feeling
- Countryside
- Food
- Re-use
- Scrap
- Artificial
- Color
- Transport
- Disposal
- Costs
- Time
- DIY
- Nature
- Smell-perfume
- Temporary
- Texture
- Biodegradability
- Lightness
- Fertility.

Starting from the identified clusters, three possible scenarios regarding the meaning of this DIY material are defined together with the participants to the workshops:
• "I want a material capable of narrating their value, engaging people in a common creative interaction" (Figure 5)

For example: in a garden the community cultivates fruits and vegetables to share. The gardeners know the DIY material and decide to produce together a few objects, which own the features of the selected by-products. The gardeners co-produce items in a material obtained within a specific context, whose identity is recalled by the use of its vegetable scraps. Some applications proposed by the gardeners in the workshops consistent with this scenario are: compost bins, tiles, fruit bowls containers and birdhouses.

Figure 5. Co&Co scenario.

• "I want people to become attached to a product made of a material carrying an imperfect beauty" (Figure 6)

For example: starting from the fruit and vegetable scraps, people can self-produce their own objects, also at home. People create an emotional connection with these objects because they have manufactured them by themselves. Their handiwork is represented by the imperfect beauty of these products: thus, the imperfection holds a value. This value is transferred to other products, also those industrially produced, encouraging the sustainability of people's behavior, who agree to use a product even if it’s marked by time.
"I want a material that is available without restriction, and it returns to a loop of material ecologies" (Figure 7)

The material creates a km-1 system: it’s born, grows, it’s harvested, it’s used to produce products, it’s put back in the subsoil, where it degrades and contributes to the start of a new life cycle. In this way the life cycles and resources are unlimitedly renewed over time, serving as the basis of a new economic system, where the main actors are communities capable of small actions which reverberate through the local and global network.

5. Discussion

The experimental study exposes some issues.

First of all, the selected material turned out to be not easy to handle. In fact, it’s necessary not only to control the working environment, but also to pasteurize the substrate which feeds the mycelium, since organisms are present in organic materials that have to be eliminated to give the mycelium a biological advantage. Otherwise, other fungi, such as for example molds, could take over. Some bacteria, however, are useful to the growth of the mycelium, so no need to sterilize the entire substrate.
The material has met with a lot of curiosity by gardeners and common people, when it was shown. This not only attracted many people to the workshops, but also allowed to have lots of feedback. The questionnaires have proved to be a bit long, while the material processing sessions were much appreciated.

The outputs are very different according to the involved users. For example, many gardeners have perceived the material as "natural"; on the contrary, design students had more difficulty in this regard. Probably this is due to the fact that the gardeners are more accustomed to nature and are therefore more capable of recognizing it in different forms and formulations. The children were very interesting, because they are more accustomed to tinkering than adults and are much less structured in their perception of the world. All this shows that the perception of the world and its meaning varies greatly among social groups and it is strongly linked to people’s experiences.

Finally, it would be interesting to implement a toolkit conceived specifically for the design of DIY materials for urban community gardens’ communities.

6. Conclusions

This study adopts tools that have been developed recently and that, therefore, few designers use. In an increasingly open-source future, it is expected that these tools and this way of conducting design research would be known by design experts, who could decide whether or not to use.

The study explores just the first two steps of the MDD Method, but in the future the research could be carried forward, investigating the other two steps and addressing the co-design issue in a more extensive way.

MDD and CCD have never had the opportunity to interact: normally a DIY material is developed by a designer or a group of designers with direct knowledge of the subject. The result is often intended for a narrow circle of professionals.

We live in a society that constantly requires its residents to reinvent themselves and re-plan their lives (Manzini, 2011). Through this study we tried to bring ordinary people near these topics, adopting both MDD and CCD tools. Everybody can design collective cre-active and meaningful experiences and behaviours in their local environment, which reflects in a glocal change and configure open societies through design thinking.
References

Ashby, M., & Johnson, K. (2002).
Materials and Design.
Elsevier.

Karana, E., Barati, B., Rognoli, V., & Zeeuw van der Laan, A. (2015).
Material Driven Design (MDD): A Method to Design for Material Experiences.
Retrieved from: http://www.ijdesign.org/ojs/index.php/IJDesign/article/viewFile/1965/687.

Karana, E., Pedgley, O., & Rognoli, V. (2014)
Material Experience.
Elsevier.

Karana, E. (2010).
Meanings of materials.
Lap Lambert Academic Publishing.

Koren, L. (2002).
Wabi-Sabi per artisti, designer, poeti e filosofi (Wabi-sabi for artists, designers, poets & philosophers).
Firenze: Ponte alle Grazie.

Manzini, E. (2015).
Design, when everybody designs: an introduction to design for social innovation.
Cambridge (Mass.); London: The MIT press, 2015.

Manzini, E. (2014)
in Lee, Y., Tsang, A., Fung, K., Open Design, co-creating our open societies through design, conversations from Open Design Forum 2014, Hong Kong, 2014.

Manzini, E. (2011).
Introduction to Meroni, A., Sangiorgi, D., Design for services, Gower Publishing Limited, Surrey, 2011.

Manzini, E. (1990).
Artefatti: verso una nuova ecologia dell'ambiente artificiale (Artifacts: Towards a New Ecology of the Artificial Environment).
Milano: Domus Accademy.

Manzini, E. (1986).
La Materia dell'Invenzione (The Material of Invention).
Milano: Arcadia Edizioni.

McDonough, W., & Braungart, M. (2003).
Cradle to Cradle: Remaking the Way We Make Things.
New York: MacMillan.

Meroni, A., & Sangiorgi, D. (2011)
Design for services
Gower Publishing Limited, Surrey.

Norman, D. (2004)
Emotional Design.
New York: Basic Books.

Ostuzzi, F., Salvia, G., Rognoli, V., & Levi, M. (2011)
Il valore dell'imperfezione : l'approccio wabi sabi al design (The value of imperfection: the wabi sabi approach to design).
Milano: Franco Angeli.
Rizzo, F. (2009). 
Strategie di co-design: teorie, metodi e strumenti per progettare con gli utenti (co-design strategies: theories, methods and tools for designing with users).

Milano: Franco Angeli.

Shifferstein, H., Hekkert, P. (2007).
Product Experience.

Elsevier.

Tanizaki, J. (1977).
In praise of shadows
Leete's Island Books, Stony Creek.

Vezzoli, C., & Manzini, E. (2008).
Design for Environmental Sustainability.
Springer-Verlag London Limited.

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