

DIY-materials as enabling agents of innovative social practices and future social business

Autores

PhD. Valentina Rognoli, valentina.rognoli@polimi.it
Camilo Ayala-Garcia, camilo.ayala@polimi.it, c.ayala954@uniandes.edu.co
Irene Bengo, irene.bengo@polimi.it
Politecnico di Milano, Italia

ABSTRACT

In the panorama of materials for design, a novel phenomenon is emerging. We already individuated it and called DIY-Materials. In the developed countries (mostly in Europe and North America), DIY-Materials are the response to an increasing standardized industrialization in the field of materials and technologies. Thanks to the democratization of technologies, today more people, designers included, have access to technology to create, edit, print, modify, share and act on anything, even on materials. The contemporary diffusion of making and the maker's space phenomena also known as FabLabs are spreading a kind of low-tech approach conversely to the classic industrial one. The designers, as well as the people, demonstrate more often a will to return to do things by themselves; by touching the source of a form, feeling the emotion of a particular surface effect, or the surprise of an unexpected color, one can gain control of any single creation.

The aim of the paper is to speak about DIY-Materials and define a new framework to explain their possible role as enabling agents of innovative social practices and future social businesses. We will present concepts like DIY practices, Material Activism, Creative Communities, Social Business and Social Innovation about materials. It is our assumption that the DIY-Materials can also arise from the creativity of a community in which the designer acts as a facilitator.

The definition of DIY-Materials becomes richer as it includes the materials as ideas that simultaneously meet social needs and create new social relationships or collaborations. In other words, they are innovations that are both good for society and enhance society's capacity to act and create social businesses.

INTRO

In the current state of technological development, talking about materials, it means to refer to what is known and established as industrial materials. They are materials classified in various families according to their physical properties and atomic composition (*Ashby, 2002*) and developed accordingly to the requirements of industrial production and standardization for gratifying the market's demands. However, there is another emerging "class" of materials, called by scholars (*Rognoli et al., 2015; Ayala-Garcia et al., 2017 a*) as DIY-Materials. By definition, DIY-Materials "are created through individual or collective self-production experiences, often by techniques and processes of the designer's invention, as a result of a process of tinkering with materials. They can be new materials with the creative use of other substances as material ingredients, or they can be modified, or further developed versions of existing materials".

We realized in this period since the first definition coined, numerous scholars, from different fields, started to show interest in the phenomenon; therefore, a broad PhD investigation on the subject is currently being conducted (*Ayala-Garcia, 2018*).

We believe that the future of DIY-Materials can follow two possible paths.

On one side, DIY-Materials can be scaled-up and transformed into industrial materials, opening possibilities to create a successful business for designers, who create meaningful products and applications when starting from the material. Those original applications sometimes respond to different requests that come from sustainability or product innovation concerns. Some others seek new aesthetic languages or even new manufacturing techniques. Previous investigations on that issue show the potential for DIY-Materials (*Ayala-Garcia et al., 2017 a; Parisi et al., 2016*).

On the other side, DIY-Materials can be triggers of social change when are used not by designers or experts in a particular field, but by the people inside a community.

The present paper focuses on the viable construction of the second path, where the DIY-Materials enable innovative social practices and help a particular group of people to become autonomous. This groups of individuals, by understanding simple methods of tinkering (*Parisi et al., 2017; Jacobsson, 2013; Karana et al., 2015*) and experimentation (*Ayala-Garcia, 2014; Nimkulrat, 2012; Louridas, 1999*) with the materials on-hands, can solve some of their wicked problems (*Rittel & Webber, 1972*) where traditional top-down methods will never reach (*Lukens, 2013*). They could even create opportunities for social businesses in different scales.

We will try to make our statement clear by connecting different definitions of several concepts we believe can be incredibly powerful if seen as a whole in this contest. The concepts are: DIY practices, material activism, creative communities, and Social Business. Those ideas, when connected, could become a strategy for Social Innovation, which is considered as one of the key tactics that our society have to challenge the course of our planet towards an unsustainable end (*Meadows, 1972; Clark, 2001*).

Firstly, we provide some definitions about all these concepts collected from scholars of different fields. After that, we present the DIY-Materials as the connectors of those concepts and as the enablers of the social innovation when materials are at the beginning of the process. At the end, we will propose a scenario where the synergy of all concepts provides fertile ground for social innovation to happen.

DIY Practices

There has been a lengthy discussion about the differences between an activity performed by professionals, like for instance, Design in an established cycle of creation and production of artefacts, and the antithesis of it, the more democratic process of self-driven and self-directed of a more amateur design and production activity carried out by people, formalized like Do-it-Yourself practices (*Atkinson, 2006*). Since the eighteen century, a forking between organized industrial processes guided by control and accuracy on one side, and the free, semi-accurate processes of traditional crafts on the other, exists. During the post-second world war periods, cause of the scarcity and the shortage of labour, the Do-it-Yourself practices gained acceptance in the majority of people. DIY practices became a democratizing alternative allowing people to create their own goods (*op. cit*). Later on, when the market has oversaturated of industrial products and the society adopted the DIY practices to involve the user in the co-creation of a project, the term prosumer came to the scene (*Toffler, 1980*). "Prosumtion activities are defined as consumers producing products for their own consumption" (*Xie, et al., 2008*). Kotler (*1986*) stated that a particular form of prosumption is known as Do-it-yourself (DIY) and defines DIY as "activities in which individuals engage raw and semi-raw materials and component parts to produce, transform, or reconstruct material possessions, including those drawn from the natural environment". Nowadays DIY practices are being empowered with the democratization of technologies (*Tannenbaum et al., 2013*) and open-sourced access that allow the prosumers to get full control of those activities. These dynamics around DIY practices have led to the emergence of new materials for product design, called DIY-Materials (*Rognoli, et al., 2015*).

Material Activism

The term "materials activism" was firstly coined by Miriam Ribul (2014) as an expression to identify a low-tech approach that will democratize the production and development of materials. In her open source publication, Ribul invites through a collection of recipes for in-house material experimentation, to understand possible paths for developing alternative materials creating new aesthetics and new materials languages.

We introduce here the concept of "activism" as a provocative exhortation to the designers to start a vigorous protest against the closed system of materials development of the industry (Rognoli & Ayala-Garcia, 2016). This industrial system often excludes designers by the lack of scientific knowledge. The designers rarely have access to the development team composed mainly of Engineers and Scientists when the market requires a new material development. In this particular rigid industrial system with plenty of entrance barriers, designers employ materials and processes already available in the market for designing. In other words, designers have become experts in material selection or select materials thanks to instruments available.

In the past two decades, a new appreciation of craftsmanship has emerged. (Bardzell et al., 2012; Bean & Rosner, 2012; Bettiol & Micelli, 2014; Sennett, 2008). Some designer recognizes themselves to belong to this category. The new craftsman is capable not only to understand and transform a particular material but also to control the technologies of transformation, and he/she is interconnected with other artisans around the globe. We can also speak about this new craftsmanship renaissance using the term of the Makers (Anderson, 2012). This movement, in many cases encouraged by the internet and the open-source philosophy, is supported and, at the same time promote, the new industrial revolution. This revolution became the fertile ground for materials activism to appear. The democratization of the means of production, combined with the people's wish for personalization and appropriation (*op. cit.*, p. 102), have opened an alternative to the closed system of industrial materials development. Also, the designer is enabled to start any materials experimentation experience that may find interesting, using any f inspirational sources (tutorial, shared previous experiences and so on). After some iterations with the material, it may also go and buy any open-sourced instrument that can help improve what he/she has created. Suddenly, the designer belongs to the emerging big group of activists that create a project starting with the material development.

The scenario we described above it was not so long ago impossible to imagine because the materials and processes were always developed and improved in a closed system inside labs and Industry's R&D sections and not at home or workshop.

Creative Communities

In the year 2006, a group of scholars led by Ezio Manzini conducted a research called Emerging Users Demands for Sustainable Solutions (EMUDE). This study revealed the existence of a dynamic form of creativity called "diffuse creativity". This kind of creativity appears in a co-operatively environment of non-specialized people seeking for a particular solution. The EMUDE research also highlighted that this enterprise of individuals who act together seeking for a particular solution of any problem inside their environment is recognizable as a "creative community". Creative communities are groups of people who invent sustainable ways of living (Manzini, et al., 2008).

Although creative communities are very diverse in their nature and in the way they operate, they act as original innovators in their local systems. These communities often challenge traditional ways of doing things introducing radical solutions (*op. cit.*). Amplifying the definition of Atkinson of DIY practices, we can also say that the community operates in a more democratic process of collective-driven and collective-directed of a more amateur design and production activity carried out by the end user. This community can act as DIYers of things,

mainly as everything they create often is a solution for them to use. These communities share another interesting feature: inside them exist individuals endowed with unique design skills who can set, translate or introduce tools and methodologies that guide the process. Just like the DIY subculture, these communities can do things that work better than the traditional infrastructure of the society (*Lukens, 2013*). They don't even expect to create general changes in the system they belong to (institutions and large infrastructures of the society that control energy, agriculture, banking and finance, water supply, public health and critical manufacturing), they just want to improve the current state-of-things producing something different.

Another important consideration highlighted in the EMUDE research about creative communities is the fact that they are deeply rooted in a place, they make good use of the local resources, and directly or indirectly they promote new ways of social exchange (*Manzini, et al., 2008*). Similar to the Maker's movement, they are globally linked to similar communities. This network enables experience and problem sharing, which in turn, allow a high chance to create innovative and sustainable solutions easy to spread around.

Social Business

The concept of social business was developed more than thirty years ago by the introduction of the Grameen Bank in Bangladesh by Muhammad Yunus. The idea behind a social business relies on the possibility to create a business or a self-sustainable company that sells goods or services repaying its owner's investments but not maximizing the value of the shareholders like a traditional business. The mission of the organization should be connected with the goal of serving the society helping to improve any local condition (*Yunus, et al., 2010*).

The concept of social business is included nowadays in the agenda of every research on business model innovation, as the traditional capitalist system business do not take into account the social and environmental benefit, or at least is not equal to the financial benefit. Different from the non-for-profit organizations who survive mainly from raising money, the social businesses need to follow the organizational parameters of a regular business enterprise to sustain over time. One of the major differences between social enterprise companies and the traditional entrepreneurship companies relays on the priority given to the core values.

As a result, Social Business occupies a unique space within the economy and can be positioned somewhere in between profit and not for profit sectors (*Alter, 2006; Mason, et al., 2007*).

Michael Braungart and William McDonough (*2002*), suggest a model that complement the idea behind a social business, with an additional consideration towards sustainability formalizing the concept of Cradle to Cradle model for developing products. Their thesis establishes a triangle of equilibrium called triple E. In this triangle, ecology, equity, and economy balance each other inside any proposed business that follows this theory. The authors state that this model takes the best of socialism and capitalism with interest in the planet. If any business considers the social wealth as equal as the environmental and economic wealth, for certain, this business will tackle many of the actual wicked problems that our modern societies deal. Moreover there is a new generation of social business: the social tech start-ups. Similarly, to high-tech start-ups, social tech start-ups are newly created organizations that are in the initial stages of their lifecycle and leverage technology to develop new products and services (*Desa & Kotha, 2006; Kamariah, Mir & Ume, 2012*). However, their distinctive feature, compared to other high tech start-ups, is that these ventures specifically aim to "develop and deploy technology driven solutions to address social needs in a financially sustainable manner" (*Desa & Kotha, 2006*).

Social innovation practices

Social Innovation has become in the recent decades a very spread and used the term by many scholars. Several attempts to define its nature as a field of research have been discussed in a structured and coherent way by many disciplines starting from Sociology (*Howaldt & Schwarz, 2010*) through Business & Economics (*Nicholls, 2006*) and recently Design (*Manzini & Meroni, 2014*).

By looking the historical analysis of macro-level Innovations across developed economies, several waves of technological change can be devised, from the industrial revolution back in the 18th century up to the age of information and telecommunication (Moulaert, 2009). Inside this current age of information and telecommunication technology, a new focus on social types of innovation has emerged (*Hobsbawm, 1999*).

There are two ways of discussion around this area: the first one is related to the systems and processes of change in social relations. The second one is related to all innovations around the conceptualization, design and production of goods and services that address social and environmental needs and market failures (*Goldenburg, et al., 2009*). As those types of innovations fall into the interests of society, the definition of social innovation it is grounded by nature in the social theory. For instance, innovation is "social" when it varies social action and is socially accepted and diffused (*Howaldt, et al., 2015*). In words of Wolfgang Zapf (2003) Social innovations can be seen as actions that spread through the society as a result of imitation, bringing about social change. In fact, all practices that we know as innovations are a consequence of imitations of little inventions that a cultural group can possess, but only through the proper diffusion in different groups of the society, become visible and therefore recognizable as Innovations. Gabriel Tarde in the first half of the past century predicted that those many inventions could change society through multiple acts of imitation and as a result innovation will become an actual social phenomenon (*Tarde, 2009*).

What we see nowadays and that is relevant for the Social Innovation theory and our research, is that there is a growing need to create innovations from the micro level of the society that can spread on a larger scale to become socially accepted and diffused. As the Vienna Declaration stated in 2011, the most crucial and important innovations in the 21st century will take place in the social field (*Franz, et al., 2012*).

Discussion

The aim of this paper is to propose DIY-Materials as possible enabling agents of innovative social practices and future social businesses. All concepts presented above, like DIY practices, Material Activism, Creative Communities, Social Business and Social Innovation in relation with materials, help to introduce the following statement.

DIY materials as enablers or triggers of social change

In all the concepts described above, the necessity of the people from different fields of knowledge to tackle the challenges of our modern societies is visible. There is today an urgent call not to change the course of what we humans have created during the evolution of our race, but to offer alternative paths, different visions and propose evidence to support those paths and ideas to make them viable. We believe that our research on materials opens new possible scenarios. As we said at the beginning, it is difficult to talk about materials outside the closed cycle of materials science and engineering. It is important to mention despite that before the first wave of technological change, known as the industrial revolution, the materials domain was in the hands of artisans, and their knowledge was diffused and connected. As said before in the 18th century there was a bifurcation between organized industrial processes guided by control and accuracy on one side, and the free and semi-accurate processes of traditional

crafts on the opposite side, exists (*Atkinson, 2006*). In that sense, we are not proposing anything new.

What we are suggesting is the opportunity for people to see materials as the triggers of change. The possibility of local communities to look at their local resources, experiment with them and find creative solutions to tackle their wicked problems guided by methodologies to deal with materials is a great challenge. However, is our believe that there is a fabulous chance for those communities to succeed by becoming materials activists. Once a local open sourced technology is controlled in a co-operatively environment of non-specialized people and based on a sustainable way to deal with materials, the products and services that emerge will become a fertile ground for social business to appear. This business will allow the maintenance of the local economy.

We believe with the previous statement that the definition of DIY-Materials becomes richer as it includes the materials as ideas that simultaneously meet social needs and create new social relationships or collaborations. In other words, they can be innovations that are both good for society and enhance society's capacity to act and create social businesses.

We believe that if the implementation of DIY-Materials as a tool for social innovation work as predicted, the spread between communities of successful practices can become an alternative to challenge classical infrastructure of the society that by its nature is unable to act in particular situations. Only then it will be considered as social innovation from materials.

REFERENCES

- Alter, S.A. (2006). Social Enterprise models and their mission and money relationships'. In A. Nicholls (Ed), *Social Entrepreneurship: New paradigms of Sustainable Social Change*. Oxford: Oxford University Press.
- Ashby, M.F., Johnson, K. (2002). *Materials selection, the art and science of product design*. Oxford, UK: Butterworth Heinemann. pp. 56-57.
- Ayala-Garcia, C., (2018). *The Materials Generation: DIY-Materials as Triggers of Social Change* (Unpublished doctoral thesis). Politecnico di Milano, Italy.
- Ayala-Garcia, C., Rognoli V., Karana, E. (2017a). Five Kingdoms of DIY-Materials for Design. In: *Proceedings of EKSIG 17 - Alive. Active. Adaptive - Experiential Knowledge and Emerging Materials*, The Netherlands. (on Press)
- Ayala-Garcia, C., Rognoli V., (2017b). The new materials aesthetics. DIY-Materials as triggers of new sensorial experiences. In: *Proceedings of 12th EAD European Academy of Design Conference Design for Next*, La Sapienza, Roma. (on Press)
- Ayala-Garcia C. (2015). The Basis of Processes – Experimenting with Food to Re-Shape the Industry Language. In: *Proceedings of Cumulus Conference, The Virtuous Circle: Design Culture and Experimentation*. Milan, McGraw-Hill Education.
- Atkinson, P (2006). Do It Yourself: Democracy and Design. *Journal of Design History* Vol. 19 No. 1. 1-10
- Anderson, C. (2012). *Makers: The New Industrial Revolution*. Crown Business. pp. 58. 102.
- Clark W. (2001) A Transition Toward Sustainability. *27 Ecology L.Q.* 1021-1076.
- Bardzell, S., Rosner, D.K., Bardzell, J. (2012). Crafting quality in design: integrity, creativity, and public sensibility. In: *Proceedings of the Designing Interactive Systems Conference (DIS '12)*, ACM, New York, NY, USA, pp. 11–20.
- Bean, J., Rosner, D. (2012). Old hat: craft versus design? In: *Interaction*, vol. 19(1), ACM, New York, NY, USA, pp. 86–88.
- Bettiol, M., Micelli, S. (2014). The hidden side of design: the relevance of artisanship. In: *Design Issues* 30 (1) (Winter 2014), pp. 7–18.
- Desa, G., and Kotha, S., 2006. Technology social ventures and innovation: understanding the innovation process at Benetech. In: F., Perrini (Ed.), *New Social Entrepreneurship: What Awaits Social Entrepreneurial Ventures?* (pp. 237–259). Northampton, MA: Edward Elgar.
- Franz, H.W., Hochgerner, J., Howaldt, J (2012). *Challenge Social Innovation. Potentials for Business, Social Entrepreneurship, Welfare and Civil Society*. Springer, Berlin. pp. 1-15
- Goldenburg, M., Kamoji, W., Orton, L. and Williamson, M. (2009), *Social Innovation in Canada: An Update*, CPRN Research Report.
- Hobsbawm, E. (1999), *The Age of Extremes: The Short Twentieth Century 1914–1991*, London: Abacus Press.
- Howaldt, J. and Schwarz, M. (2010) 'Soziale Innovation' im Fokus. Skizze eines gesellschaftstheoretisch inspirierten Forschungskonzepts. [Social Innovation in Focus. A Sketch of a research concept inspired by economics theory] Bielefeld: transcript.
- Howaldt, J., Kopp R., Schwarz, M. (2015). Social Innovations as Drivers of Social Change – Exploring Tarde's Contribution to Social Innovation Theory Building. In A. Nicholls, J.

- Simon & M. Gabriel (Eds.), *New Frontiers in Social Innovation Research* (pp. 29-51). PalgraveMacmillan, UK.
- Jacobson, M. (2013). *Thinkering with Interactive Materials: Studies, concepts and prototypes*. Royal Institute of Technology.
- Kamariah, I., Mir, H., S., and Ume, N., A., 2012. Technology social venture: A new genre of social entrepreneurship? *Procedia - Social and Behavioral Sciences* 40, 429 – 434.
- Karana, E., Barati, B., Rognoli, V., & Zeeuw van der Laan, A. (2015). Material driven design (MDD: A method to design for material experiences. *International Journal of Design*, 9(2), 35-54
- Kotler, P. (1986). The Prosumer Movement: A New Challenge For Marketers in NA - *Advances in Consumer Research* Volume 13, eds. Richard J. Lutz, Provo, UT : Association for Consumer Research. 510-513.
- Louridas, P. (1999). Design as bricolage: anthropology meets design thinking. *Design Studies*, Elsevier, 20(6), 517-535.
- Lukens, J. (2013). *DIY Infrastructure*. PhD Thesis, Georgia Institute of Technology.
- McDonough W, Braungart M. (2002). Design for the triple top line: new tools for sustainable commerce. *Corporate Environmental Strategy* 2002;9(3): 251e8.
- Manzini, E., Meroni, A. (2014). Catalysing social resources for sustainable changes: Social innovation and community-centred design. In C. Vezzoli, C. Kothala & A. Srinivasan (Eds.), *Product- Service Design for Sustainability* (pp. 362-379). LENS, Learning Network on Sustainability: Greenleaf Publishing Limited, UK.
- Manzini, E., Jégou, F., Penin, L. (2008). Creative Communities for Sustainable Lifestyles. In: *Sustainable Consumption and Production: Framework for Action*. 2nd Conference of the Sustainable Consumption Research Exchange (SCORE!) Network, Brussels. 259-276
- Mason, C., Kirkbride, J., & Bryde, D. (2007). From stakeholders to institutions: the changing face of social enterprise governance theory. *Management Decision*, 45, 284–301.
- Meadows, D. H.; Meadows, D. L.; Randers, J.; Behrens III, W. W. (1972), *The Limits to Growth: a report for the Club of Rome's project on the predicament of mankind*, Universe Books. pp. 45-87
- Moulaert, F. (2009), 'Social Innovation: Institutionally Embedded, Territorially (Re)Produced', in D. MacCallum, F. Moulaert, J. Hillier, S. Haddock (eds) (2009), *Social Innovation and Territorial Development*, Ashgate, pp. 11–23.
- Nicholls, A. (ed.) (2006), *Social Entrepreneurship: New Models of Sustainable Social Change*, Oxford University Press.
- Nimkulrat, N. (2012). Hands-on Intellect: Integrating Craft Practice into Design Research. *International Journal of Design*, 6(3), 1-14.
- Parisi, S., Rognoli, V., Ayala Garcia, C. (2016). Designing materials experiences through passing of time: Material driven design method applied to mycelium-based composites. In *Proceedings of the 10th International Conference on Design and Emotion-Celebration and Contemplation* (pp. 239-255).
- Parisi, S., Rognoli, V., Sonneveld, M. (2017). Material Tinkering. An inspirational approach for experiential learning and envisioning in product design education. In: *Proceedings of 12th EAD European Academy of Design Conference Design for Next*, La Sapienza, Roma. (on Press)

- Ribul, M. (2013). Receipts for materials activism. Retrieved from: https://issuu.com/miriamribul/docs/miriam_ribul_recipes_for_material_activism/ch1j
- Rittel, H., Webber, M. (1973). Dilemmas in a General Theory of Planning. *Policy Sciences* 4, no. 2 (1973): 155-169.
- Rognoli, V., Ayala-Garcia, C. (2016). Material Activism. New Hybrid Scenarios Between Design and Technology. In: *Cuadernos de Palermo: Cuadernos del Centro de Estudios en Diseño y Comunicación*. Buenos Aires (on Press)
- Rognoli, V., Bianchini, M., Maffei, S., Karana, E., (2015). DIY Materials. *Materials and Design*, 86(2015), 692-702
- Sennett, R. (2008). *The Craftsman*. Yale University Press, New Haven, 2008.
- Toffler, A. (1980). *The Third Wave*. New York: William Morrow.
- Tanenbaum, J.G., Williams, A.M., Desjardins, A., Tanenbaum, K. (2013) Democratizing technology: pleasure, utility and expressiveness in DIY and maker practice, *Proceedings of CHI 2013*, April 27–May 2, 2013, Paris, France.
- Tarde, G. (2009) *Die Gesetze der Nachahmung [The Law of Imitation]* of. Frankfurt a.M.: Suhrkamp. pp. 26
- Vienna Declaration (2011) The Most Relevant Topics in Social Innovation Research. Concluding resolution provided by the conference ‘Challenge Social Innovation. Innovating Innovation by Research – 100 Years after Schumpeter’. Available at: <http://www.socialinnovation2011.eu/> [Accessed 5 November 2014.]
- Xie, C., Bagozzi, R.P. and Troye, S.V. (2008) ‘Trying to Prosume: Toward a Theory of Consumers as Co-creators of Value’, *Journal of the Academy of Marketing Science* 36: 109–22.
- Yunus, M., Moingeon, B., Lehmann-Ortega, L. (2010.) *Building Social Business Models: Lessons from the Grameen Experience*. *Long Range Planning* 43 (2010), 308-325.
- Zapf, W. (2003) ‘Sozialer Wandel’, [Social Change] in Schäfers, B. (ed.), *Grundbegriffe der Soziologie*. Opladen: Leske Budrich. pp. 427.