On the attachment of “makers” to their objects: understanding the environmental effects of digital DIY.

Author: Irene Maldini, MA
Supervision: Javier Gimeno Martínez and Ginette Verstraete (VU University Amsterdam)
Collaboration: Bas van Abel, Frank Kresin and Alex Schaub (Waag Society)
Sponsorship: VU’s Faculty of Arts Embedded Research Program

Outcomes of the research project “Object-user relationships in open design dynamics”, an embedded research of the Faculty of Arts (VU University Amsterdam) in collaboration with Waag Society (Institute of Art, Science and Technology): 15/9/2012 – 15/6/2013. <www.onmyresearch.blogspot.com>
The full academic article that resulted from this project is in process of publication at The Design Journal (Bloomsbury).

Digital fabrication tools, such as 3D printers (which build objects by adding plastics or other materials layer by layer), laser cutters (which cut or engrave sheet materials) and milling machines (which can subtract matter from similar materials in a mechanical, computer-controlled way), are expected to change the way we will produce and consume objects in the future. However, there are different points of view about the socio-economical effects of widespread "digital DIY" practice. The environmental implications of these so-called "disruptive technologies" are also in discussion. Some authors argue that it is not yet clear if they will reduce the energy used and waste produced to fulfill our desires and needs for new objects, or if these easy and cheap processes of production will increasingly fill our world with trash instead.[1] Others support the hypothesis that the development and popularization of these tools will bring us a more sustainable system of production and consumption. The main arguments of this last group are that this system can substitute mass production with a model that a) promotes local production (consumption via digital DIY may employ less energy in transportation),[2] b) it is based on 'pulling' rather than 'pushing' goods, meaning that manufacture is made by users on demand, avoiding unnecessary production,[3] and c) individuals involved in the design and manufacture of objects ('makers') become particularly attached to their artefacts; this attachment may discourage them to substitute their DIY objects by new ones, extending the life-span of goods.[4]

During the academic year 2012-2013 we developed - at VU University and in collaboration with Waag Society – a research project to better understand this third issue. The questions raised where: What can we say about attachment and durability of digital DIY objects based on the activity and feelings of actual makers? And based on this analysis: What may be the impact of this growing phenomenon on the environment? In order to study these topics, we performed an ethnographic study of the FabLab Amsterdam users, more specifically, of makers that had digitally-fabricated objects for themselves during the previous five years. By observing their activities, selecting the relevant participants through an online survey and interviewing the selected makers about their objects, we concluded that:

---

[1] Catarina Mota, 'The rise of personal fabrication', in *Proceedings of the 8th ACM Conference on Creativity and Cognition* (2011): 285.

[2] Thomas Easton, 'The Design Economy', *The Futurist*, January-February, 2009, 45; Thomas Birtchnell and John Urry, 'Fabricating Futures and the Movement of Objects', *Mobilities*, 8(3), 2013, 388-405.

[3] Michel Avital, 'The Generative Bedrock of Open Design', in *Open Design Now, Why Design Cannot Remain Exclusive*, ed. Bas van Abel et al. (Amsterdam: Bis, 2011), 57; Dominic Muren, 'Education for an Open World: A New Toolbox for Design Students' (paper presented at the Industrial Designers Society of America (IDSA) International Conference, Portland, Oregon, August 4-7, 2010).

[4] Tommy Laitio, 'From Best Design to Just Design', in *Open Design Now: Why Design Cannot Remain Exclusive*, ed. Bas van Abel et al. (Amsterdam: Bis, 2011), 195-198.

- The objects produced by digital DIY are not substitutes for mass-produced ones; rather, they tend to be a substitute for traditional DIY or create a new category of objects that otherwise would not exist. Therefore, comparisons of the environmental implications of digital DIY with those of mass production are irrelevant; this technology increases the amount of goods actually being produced and consumed.
- Participants place a high value on their projects, to which they are particularly attached.
- This strong attachment to the project, however, does not imply that each of the objects produced are irreplaceable (and therefore more durable). On the contrary, digital fabrication tools separate the phases of virtual creation and material production; they make objects easily replaceable, reducing the possibility of a long life-span.
- Moreover, the attachment to the project implies that makers often seek to continuously improve their creations, periodically producing new versions of their objects.
- The interviewees of this study used considerable amounts of resources and produced waste for their projects, as the materials used were not local (they required transportation anyway) and were not available in the exact quantities or sizes needed; therefore, they had to acquire unnecessary amounts.
- An exception to this general picture of increasing production and consumption in digital DIY is the fact that it enables users to repair objects.

We consider that the real value of digital DIY is that a) it empowers users to fulfil their needs in an autonomous way, resulting in a more diverse, 'human-scale' material culture, and b) makers experience feelings of enjoyment and achievement resulting from taking action. However, the findings of this study do not point to a positive impact of this practice on the environment.

The negative consequences of increased consumption enabled by the popularization of digital fabrication tools could be reduced by considering the following recommendations:

- Educating makers to take into account the environmental implications of their design decisions: promoting the use of local and recycled materials, highlighting the value of repair and re-use, and considering the efficiency of production beyond the individual level.
- Promoting fabrication centres such as FabLabs rather than digital tools on a domestic scale. These labs might create a supply base of popular materials that can be used by several makers, reducing the energy used for transportation, as well as waste. In the same line, the shared space and experience may lead to more effective practices, with the use of fewer resources throughout the process (e.g. producing fewer prototypes).

Overview of the Fablab users interviewed for this study and their digital DIY projects

	B 1	C 2	D 3	E 4	F 5	G 6	H 7
Maker	Object	Date of fabrication	Quantity produced	Materials	Manufacture process	State in February-March 2013	Alternative to digital fabrication [5]
Frank	Mould for stencils	Sept 2012	2	Cardboard	Laser	Thrown away	Traditional DIY
Jeroen	Spice rack	2008	2	Plexiglas	Laser + assembly	In use	None or traditional DIY
Mickael	Stamp	Oct 2011	2 prototypes 1 final	Rubber	Laser	Two thrown away One in use	Traditional DIY
Alex	Part of a suitcase	Jan 2012	2 prototypes 1 final	Foam	Milling	In use	None or traditional DIY
Michele	Magazine stand	July 2011	1	Plywood	Laser + assembly	Thrown away	None
Rob	Key rings	May 2012	20 prototypes	Leather	Laser	Some in use Some stored	None
Suzanne	Jewellery	Oct 2012	Several prototypes 4 final	Plexiglas, wood	Laser	Some in use Some thrown away Some stored	Traditional DIY
Floortje	Animation machine	Sept 2010	25 prototypes 200 final	Paper	Laser	Some in use Some given away Some thrown away	Traditional DIY (less quantity)
Jorn	Lamp	2010-2012	1 prototype 1 final for himself 11 for others	Laminated wood, Plywood	Laser + carpentry	One in use Some sold Some stored	None
Rogier	Door	Dec 2011	3	Plywood	Milling + carpentry	In use	Second-hand purchase
Barbara	Bag	Beginning 2011	1	Leather	Leather craft + laser	Sold	Traditional DIY
Boy	Tap washers	Mar 2012	30	PLA	3D printing	Some in use Some stored	None
Ed	Lamp base	April 2012	1 prototype 1 final	PLA	3D printing	In use	Traditional DIY

[5] Interviewees were asked: 'What if digital fabrication was not available?', responses like Jorn's: *'I don't think there would be a lamp'*, were classified as 'None' while others such as Frank's*: 'before using the FabLab I was making them by hand'* were categorized as 'Traditional DIY'.