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Group Assembly Process (GAP) - Stirring Paper

# FabLabs, 3D-printing and degrowth – Democratisation and deceleration of production or a new consumptive boom producing more waste?

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*This Stirring Paper addresses the question to what extent small-scale additive manufacturing can contribute to peer production, collaborative and open source economy. The environmental risks and chances of these technologies as well as their relation to consumerism will equally be discussed.*

## What are additive manufacturing, 3D-printing and FabLabs?

Additive manufacturing is a procedure in which an object is formed successively from layers of material following a computer model. 3D-printing is the most prominent example of these techniques, which are the technological backbone of the FabLab movement.

FabLabs are open high-tech workshops where individuals have the opportunity to develop and produce custom-made things which are not accessible by conventional industrial scale technologies. Furthermore, FabLabs are strongly connected to activities in social networks and the exchange of knowledge. Therefore they are based on the idea of collaboration, decentralization, participation and democratisation (Gershenfeld 2005). FabLabs and additive manufacturing could therefore be part of a new mode of innovation, production and consumption.[1]

The idea of FabLabs started in 2002 at the MIT. Small groups of people get involved in open and collaborative high-tech workshops to individualise designs, products and new manufacturing processes. The equipment of a FabLab typically consists of a 3D-printer, a laser cutter and a milling machine. Nowadays there are more than 100 FabLabs worldwide. The first German FabLab started in 2009 at the RWTH Aachen. Surprisingly, this development is not restricted to developed

[1] With respect to technology and equipment used there is a somewhat similar concept called Techshop. Nevertheless Techshop is a commercially oriented business comparable to copyshops.

countries only, but can also be observed in Africa and Asia - even Afghanistan possesses a FabLab.[2] Especially for developing countries 3D printing holds a high potential to overcome the poor availability of spare parts, high-tech and customised objects.[3] Thus the FabLab-movement affects one of the main ideas of sustainable development: balancing human welfare, fairness and participation on a global scale.

In 2008 the first low price 3D-printer named RepRap[4] (*Figure 1*) was presented. The RepRap is sold as a construction kit: Most of the parts can be 3D-printed, the required software is open source. The remaining parts are easily available in a construction store. As a matter of fact one of the main ideas of fabbing is self-replication of production machines. The RepRap (GB) was followed by the commercial models MakerBot (US) in 2009, the Ultimaking (NL) and the ShaperCube (D) in 2011.

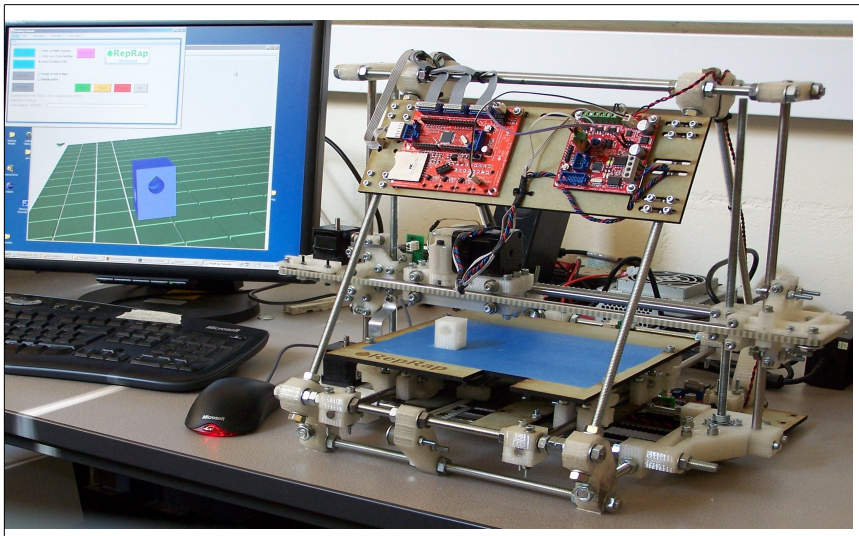

*Figure 1: RepRap, model 'Mendel',*

## Economic perspectives or a new way of producing things: decentralised production, sharing, commons and open source

Due to the success and the vast perspectives of this new type of production, some authors speak of the "third industrial revolution" (Gershenfeld 2005, Anderson 2010, Rifkin 2011). But while authors from the technical field mostly see the potentials in empowering and training people for a decentralized self-governing production process, most economic perspectives on the subject do not leave the classical narrative of economic growth, thus privileging profit-oriented technologies

[2] http://fab.cba.mit.edu/about/labs/, accessed 27.02.2014.

[3] An often quoted example is the printing of prostheses: http://www.idigitaltimes.com/articles/21488/20140114/3d-printing-prosthetic-limbs-project-daniel-healthcare.htm , accessed 28.02.2014.

[4] http://reprap.org/wiki/RepRap , accessed 28.02.2014.

over the collaborative, sufficiency orientated ones (Economist 2012). Issues of intellectual property (IP) can be counted among the central aspects of this debate. Some authors express the views that profit-orientated, expensive proprietary raw materials and designs ("lock-in effect") are inhibiting factors for the development of the technologies of additive manufacturing (Lipson 2013, 67).

However, the RepRap concept and the bourgeoning open internet databases for designs show the high potential of the open source model. A self-replicating machine is anti-commercial in itself since it is conceptually the complete opposite of devices whose lifespan is artificially shortened (planned functional and psychological obsolescence). As a production environment, FabLabs are collaborative spaces where information and 3D- printing infrastructure are shared.

Finally, assuming that in the future people would have a reasonable choice between buying and producing things themselves, the concept of “commodity” might become obsolete - if everybody had access to production capacities, use-value would prevail over exchange value (Rumpala 2012).

### Environmental issues

No technology can be sustainable in itself – for it to contribute to a truly green economy in a degrowth society, the attitudes and needs of the people have to be addressed as well (Grunwald 2002, Lipson 2013). Thus the technology of a decentralized production holds a twofold potential: on the one hand the risk of exploding production and consumption of easy-to-make, easy-to-throw-away gadgets and on the other hand new possibilities for sufficiency, ecological design and repair-culture.

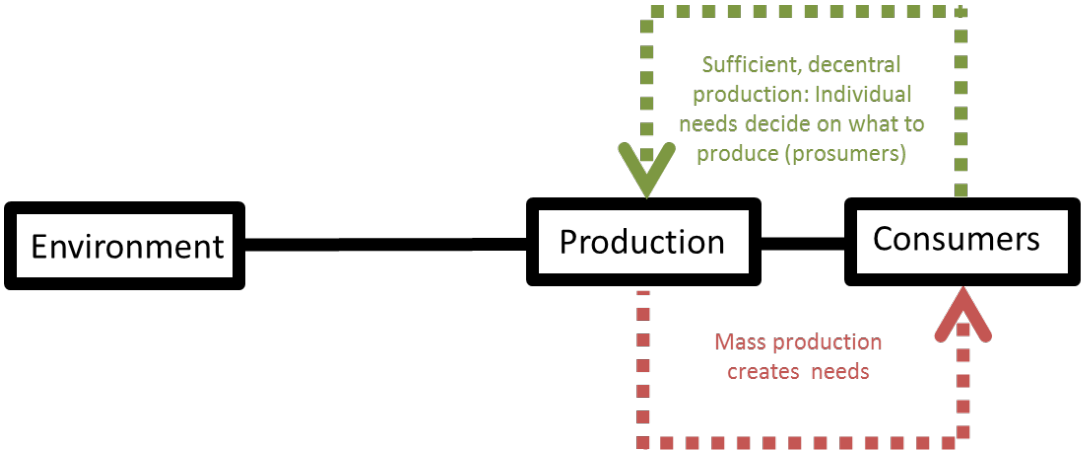


*Figure 2: Mass production vs. individual production*

However there is reason to believe that the participation in a collaborative production process as a prosumer[5] fosters knowledge and therefore permits people to be more critical towards the promises of the marketing strategies of mass production (Figure 2). So the reconciliation of the subject of consumption and the subject of production could prove a crucial step to rediscover our needs in the first place and to control a production that responds to those needs instead of an external mass production that creates needs (Gorz 2008).

From a resource point of view a lot of work is still to be done. For the time being most 3D printers run on fossil fuel based polymers and process efficiency is still poor. There is currently research on using materials made from biomass or recycled waste.[6] Some authors also discuss a modular model of production. The raw material in this model consists of little units of material, roughly like a Lego-type construction system (Kostakis 2013). This digitizing of the physical world would inversely imply that recycling simply consists in disassembling the modular elements (Gershenfeld 2005).

**What is at stake? Issues of fabbing and 3D printing and choices to discuss during the GAP:**

**Which industrial revolution?** Can the so-called „third industrial revolution“ lead to a real

[5] Neologism composed of “producer” and “consumer”.
[6] See for instance the Recyclebot: http://www.appropedia.org/Recyclebot; accessed 27.02.2014.

democratisation of production or does it only mark the beginning of another phase of the current economic system based on the myths of unlimited consumption and growth?

**How will our relation to objects and production change?** Will the possibility of self- and custom-made spare parts open the path to a new repair-culture or will additive manufacturing foster the production of single-use objects and cause ever faster obsolescence in ever shorter cycles of innovation?

**What are the environmental issues of the wide-spread use of additive manufacturing?** Are we heading for a smaller scale, resource-friendly and collaborative mode of production of less and better objects or an exploding production of plastic trinkets with a 3D-printer in every household?

**How are 3D-printing and fabbing related to open source, sharing and the commons?** Which chances and perspectives do open source models like RepRap have vis-à-vis commercial ones like Stratasys or Makerbot?

**Will they also contribute to more north-south- and gender- equality?** How to reach more people? FabLabs are already rapidly expanding to the global south, but the question is how this development can be enhanced further. Another problem is that, for the time being, women are more or less absent from the FabLab scene. So another future challenge will be to break up the clichés and prejudices according to which "making" and "tinkering" are exclusively masculine activities.

*There is the option to demonstrate 3D-printing in the GAP to offer a more plastic impression to the participants.*

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