

Building Open Design as a Commons

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The concept of Open Design has been embraced by numerous initiatives in design, from furniture to textiles, from product design to social design since its introduction in the early 2000s.¹ Open Design has also brought a revival to openness and sharing in technical domains such as hardware and electronics. Sharing design and production files and instructions has become an almost compulsory ingredient for projects and initiatives that aim to convey a critical dialogue on making, producing, and manufacturing the things that dominate the lives of 21st century city dwellers in the global North.

Open design has been proposed as the key ingredient to make and discuss circular products in events such as the 'Open Source Circular Economy Days'² and the 'POC21 Innovation Camp'.³ Open design has become the preferred *modus operandi* for social design. Increasingly, open design inspires the design and manufacturing sectors and their related institutions. Premsele, (at the time) the Netherlands Institute for Design and Fashion,⁴ was a key partner in publishing the volume *Open Design Now*.⁵ In 2018, the Danish Design Centre ran a program for designers and manufacturers to grow their business 'by going open source'.⁶ Open design, and research about open design, have predominantly been obsessed with the characteristics of open, legal frameworks that would facilitate the openness of design, the control that designers would need to relinquish, and the open access to design resources that everyone would receive.⁷ However, less attention has been paid to how communities of multiple actors might self-organize in order to create, build, share, and preserve those open design resources.

In this article, we trace open design back to its roots and – by building on experiences from a recent open design initiative as well as research into open design practices – we relate the 'how to organize' question of open design to earlier theories of common, shared resources.

Open Design

According to Berlin-based designer Ronen Kadushin, open design employs two generative mechanisms:

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- 1 Berlin-based 'open' designer Ronen Kadushin received his M.Des. degree on Open Design in 2004 from Middlesex University, London.
 - 2 Roberta De Angelis, *Business Models in the Circular Economy: Concepts, Examples and Theory*. Cham, Palgrave Macmillan, 2018. p. 25.
 - 3 Adrian Smith, Mariano Fressoli, Dinesh Abrol, Elisa Arond, Adrian Ely, *Grassroots Innovation Movements*. London: Routledge, 2017, p. 1.
 - 4 Since 2013, Premsele is part of the 'New Institute'.
 - 5 Bas van Abel, Lucas Evers, Roel Klaassen, Peter Troxler (eds), *Open Design Now. Why Design Cannot Remain Exclusive*, Amsterdam: BIS publishers, 2011.
 - 6 <https://remodel.dk>.
 - 7 Étienne Boisseau, Jean-François Omhover and Carole Bouchard, 'Open-design: A State of the Art Review', *Design Science*, 4.3 (2018).

1. sharing digital design files on the internet under a license that allows re-use and modification of a design, and
2. creating designs that can be manufactured directly from the design files without the need for specialist machinery or tooling.⁸

Elsewhere, open design has been defined as 'design whose makers allowed its free distribution and documentation and permitted modifications and derivations of it'.⁹ This definition has its roots in software. Rather than actually *defining* what 'open' is, this second definition sets out what the *consequences* of 'open' are.

Both definitions approach open design from the perspective of the designer as the author of a design who resigns the exclusive authorial rights of making commercial use of that design. Leon Cruickshank, professor of Design and Creative Exchange at Lancaster University, more succinctly defines open design as

models based on giving things away (free revealing), mass participation in design, co-creation and a range of other approaches that seek to develop new open methods of creativity [...] not necessarily based on conventional business models and a market economy.¹⁰

Cruickshank's formulation adds two elements to the former definitions: the notion of 'mass participation' and the idea of deviating from conventional business models and a market economy. These two additions are crucial to the understanding and further development of open design. However, the guidelines Cruickshank develops for designers, design participants, and design facilitators remain restricted to the core process of creating open design. Questions about building, sharing, and preserving of open design remain unasked – and unanswered.

Mass Participation in the Danish Remodel Example

In 2018, the Danish Design Center started an initiative to introduce open source principles to manufacturers as an instrument to develop new business models. It was aptly named 'Remodel'. Eight Danish manufacturing companies followed the program.¹¹ Those eight companies came from a variety of industries: interior and furniture design, architecture, electronic devices and tools, but also food and biotechnology.

The program consisted of seven phases:

1. discovering open source
2. imagining going open

⁸ Peter Troxler, 'The Beginning of a Beginning of the Beginning of a Trend', in Bas van Abel, Lucas Evers, Roel Klaassen and Peter Troxler (eds) *Open Design Now: Why Design Cannot Remain Exclusive*, Amsterdam: BIS Publishers, 2011, pp. 108-115.

⁹ <http://www.opendesign.org/odd.html>.

¹⁰ Leon Cruickshank, *Open Design and Innovation: Facilitating Creativity in Everyone*, London: Routledge, 2014, p. 23.

¹¹ Initially, the project started with ten companies, two of which left the whole program early.

3. visualizing user journeys
4. drawing a community and system map
5. community testing of the approach in a hackathon
6. further developing a community
7. prototyping the (new) product ecosystem

A recurring theme in the Danish Design Center's program was thus the idea that companies should involve 'the community' in their open source projects, a goal that corresponds to Cruickshank's notion of 'mass participation'. The companies indeed developed the desire, drive, and determination to identify 'somebody' (or some bodies) to contribute to the body of open design(s) their projects were built upon. Their approaches varied little, as all companies proposed some kind of online platform where variations of existing designs or new designs would be collected and exchanged in order to broaden the companies' offerings and to serve customers with more suitable solutions. Companies were split on who the participants of and contributors to these platforms would be – either designers (three companies) or customers (five companies). Designers would contribute to the product catalogue of the company owning the platform, thereby expanding its assortment, occasionally with the prospect that designers could earn royalties and benefit from exposure on the platform. Customers would document how they adapted existing products to their individual needs, therefore helping the companies to better adjust their products to customer needs. What is striking is that both versions had one aspect in common: the community, via the platform, would contribute primarily to the business of the platform's initiator. Only two of the eight companies mentioned any aspect of reciprocity in their proposals.

The Role of the Community

During the closing discussions of the Remodel initiative, a recurring topic was the idea of platform and community building. While all the participating companies included a platform where a community would meet in their proposals, they all struggled to imagine how to implement that strategy. The obvious solution participants at the closing suggested was some sort of community building and community management efforts to try to attract more engaged people to the open design project in question. The corresponding instruments mainly included attempts to make the community in question appear more desirable, more difficult to get access to, and other nudging and social engineering tactics. Echoing the absence of any reciprocity in the proposals, the obvious 'what's in it for me' question of prospective community members never arose in the discussion.

However, as earlier analyses by IT management researchers Bo Xu, Donald R. Jones and Bingjia Shao as well as work from design researcher Ali Gürcan Özkil have shown, the large majority of open design projects both in hardware and software have not attracted a

large number of contributors, i.e. they remained relatively inactive and dormant.^{12,13} Indeed, Jérémy Bonvoisin and colleagues at the French-German research project 'OPEN! Methods and tools for community-based product development' noticed that even the open source hardware projects with the most active communities showed substantially less contributions than typical closed source, industrial projects.¹⁴

Another study by business and innovation scholars Laetitia Thomas and Karine Samuel suggested that successful open source projects in product design were community-centric. They emerged initially from the community in order to solve a problem experienced by the very same community. The community itself grew by attracting more talent to solve the problem.¹⁵

Community-based Business Models

Indeed, in a previous study I co-authored with Patricia Wolf, we pointed out that it is important to differentiate between *community-oriented* and *community-based* business models. Community-oriented models aim to extend a central firm's business model by interacting with a 'community' that typically consists of user-client-stakeholders, but these models suffer from the friction between the business imperative of maximizing profits and the community values of sharing and altruism.¹⁶

In that multiple case-study, we analyzed the business models of digital maker-entrepreneurs.¹⁷ Digital maker-entrepreneurs are people who create designs digitally, share them on online platforms such as Thingiverse, employ digital manufacturing technologies such as 3D printing to produce them, and generally use these technologies as a generative mechanism for their entrepreneurial activities. We were particularly interested in the paradox between, on the one hand, the freely available designs that are supposed to be reproduced with readily available technology at marginal cost and, on the other hand, the people using those very designs to earn money. For this reason, we especially tried to locate participants on the platform who had built a successful business out of (re)using shared designs.

For the analysis we looked at business models as activity system, as suggested by management scholars Christoph Zott and Raphael Amit.¹⁸ For the in-depth analysis we referred to

12 Bo Xu, Donald R. Jones D R, Bingjia Shao, 'Volunteers' Involvement in Online Community Based Software Development', *Information & Management*, 46.3 (2009): pp. 151-158.

13 Ali Gürçan Özkil, 'Collective Design in 3D Printing: A Large Scale Empirical Study of Designs, Designers and Evolution', *Design Studies*, 51 (2017): pp. 66-89.

14 Jérémy Bonvoisin, Tom Buchert, Maurice Preidel, and Rainer G. Stark. 'How Participative Is Open Source Hardware? Insights from Online Repository Mining', *Design Science*, 4.19 (2018), <https://doi.org/10.1017/dsj.2018.15>.

15 Laetitia Thomas and Karine Samuel, 'Characteristics of Open Source Business Models', The XXVIII ISPIM Innovation Conference – Composing the Innovation Symphony, Vienna, 18-21 June 2017.

16 Patricia Wolf and Peter Troxler, 'Community-based Business Models. Insights from an Emerging Maker Economy', *Interaction Design and Architecture(s) Journal - IxD&A*, 30 (2016): pp. 75-94.

17 Peter Troxler and Patricia Wolf, 'Digital Maker-Entrepreneurs in Open Design: What Activities Make Up Their Business Model?', *Business Horizons*, 60.6 (2017): pp. 807-817.

18 Christoph Zott and Raphael Amit, 'Business Model Design: An Activity System Perspective', *Long*

activity theory as a framework which again uses activity as a unit of analysis.¹⁹

We analyzed three cases in detail: a web shop for 3D printed objects, a serial entrepreneur in 3D printing, and a hardware engineer who introduced 3D printing at work and later became an entrepreneur himself. The cases revealed that digital maker-entrepreneurs specifically described both their customers and their suppliers in terms of community. They also spoke about the relations within their firm in community terminology. The digital maker-entrepreneurs mentioned notions of 'co-creation' and 'co-ownership' and made references to community stewardship such as 'fairness' and 'reciprocity' – by giving credit when reusing designs, by freely sharing their own designs, and, for example, by implementing a revenue-sharing program.

These examples illustrate how business models emerge from the community itself and create value for the community. Øystein Fjeldstad and his colleagues suggested three success factors for such models:

1. actors who have the capabilities and values to self-organize;
2. commons where the actors accumulate and share resources; and
3. protocols, processes, and infrastructures that enable multi-actor collaboration.²⁰

In line with the findings by Thomas and Samuel, we found that entrepreneurs emerging from such communities combined building blocks exhibiting altruism with building blocks covering basic costs in order to develop new, hybrid business models. We also found that those entrepreneurs employed novel governance principles such as reciprocity and fairness to guide their business activities.

Communities as Stewards of Open Design

Through studying new business models and organizational designs from an actor-oriented perspective, both our findings and Fjeldstad's observations point to new ways of doing

Range Planning, 49(2-3) (2010), pp. 216-226.

19 In activity theory, activity is initiated by *subjects* acting alone or in groups and is directed at a certain goal, called *object*. The framework situates the activity at the center of an entire activity system. Beyond the subjects with their history, culture, and so on, the system also describes the *artifacts* or tools the subjects use to achieve their objects. Furthermore, activity theory describes how the subject-artifact-object triad is embedded in a socio-cultural context, described in terms of loose networks of people (or *community*), stabilized procedures imposed on the activity (called *rules in place*), and the formally appointed functional groups involved in carrying out the activity which are produced by and result in a *division of labor*. For more details about activity theory, see for example Frank Blackler, 'Knowledge and the Theory of Organizations: Organizations as Activity Systems and the Reframing of Management Studies', *Journal of Management Studies*, 30.6 (November 1993): pp. 863-884; Yrjö Engeström, *Learning by Expanding: An Activity-Theoretical Approach to Developmental Research*. Helsinki: Orienta-Konsultit, 1987; and Yrjö Engeström, 'Activity Theory as a Framework for Analyzing and Redesigning Work', *Ergonomics*, 43.7 (2000): pp. 960-974.

20 Øystein D. Fjeldstad, Charles C. Snow, Raymond E. Miles, and Christopher Lettl, 'The Architecture of Collaboration', *Strategic Management Journal*, 33.6 (2012): pp. 734-750.

business that are fundamentally different from traditional textbook approaches. In fact, self-organization in multi-actor communities that build and share resources has been observed before. In a paper from 1990, Nobel Prize winner Elinor Ostrom described how she had studied a large number of self-governed forests, fisheries and water-rights that were called 'common pool resources' (CPRs) or 'commons'.²¹ Some of these CPRs were successful at preserving the resource, some of them less so.

From her observations, Ostrom was able to formulate eight design principles that 'account for the success of these institutions in sustaining the CPRs and gaining the compliance of generation after generation of appropriators to the rules in use'. The eight design principles are (1) a clear definition of a CPR, (2) the congruence of rules and local conditions, (3) participation in rule making, (4) in monitoring, (5) in sanctioning, (6) access to conflict resolution mechanisms, (7) rights to organize, and (8) nesting of CPRs in larger systems.²²

It is interesting to note that open design has indeed been compared to a commons in the sense of an openly accessible resource.²³ Yet Ostrom's design principles rarely have surfaced in the discussion. Studying open design as an activity system rather than purely as a resource reveals self-organization in multi-actor communities that indeed care for a shared resource. The activity systems we find in open design resemble Ostrom's institutions that sustain a common pool resource – a commons – for generation after generation.

Relating this observation back to the questions emerging from the Remodel project, we propose to adopt Ostrom's principles when creating, building and nurturing a community as owner of an open source product development project. If we merely study open design as a (passive) resource, we overlook the fact that it involves a lot of work, intentionality, and self-organization in order to generate and maintain such a resource. For simplicity, our proposal groups them into five, rather than eight, design principles:²⁴

1. *Clearly defined boundaries.* Participants who have the rights to draw resources from the project must be clearly defined, as must the boundaries of the project (1). This point most directly corresponds to the suggestions of community-building mentioned earlier.
2. *Congruence between appropriation and provision rules and local conditions.* Rules restricting time, place, technology, or quantity of resource appropriation are related to local conditions and to provision rules requiring labor, material, or money (2). This point highlights what we referred to above as community-centric problems at the core of open design projects.
3. *Governance.* Most participants affected by governing rules can participate in defining and modifying these rules, through monitoring conditions and appropriate behavior,

²¹ We use the terms interchangeably.

²² Elinor Ostrom, *Governing the Commons. The Evolution of Institutions for Collective Action*. Cambridge, MA: Cambridge University Press, 1990, p. 90.

²³ For a recent study and summary, see Kosmas Gavras, 'Open Source Beyond Software: Re-invent Open Design on the Common's Ground', *Journal of Peer Production*, 13 (April 2019), <http://peerproduction.net/issues/issue-13-open/peer-reviewed-papers/open-source-beyond-software/>.

²⁴ Within our grouping, we provide the reference to Ostrom's original numbering in brackets.

sanctioning participants who violate rules, and resolving conflicts (3, 4, 5, 6). This point refers to the protocols, processes and infrastructures that enable collaboration.

4. *Relative independence* (minimal recognition of rights to organize). The rights of participants to devise their own institutions are not challenged by external authorities (7).
5. *Nested enterprises*. Appropriation, provision, monitoring, enforcement, conflict resolution and governance activities are organized in multiple layers of nested enterprises in the case of larger systems (8). This is reflected, for example, in the digital maker-entrepreneurs who operated in the context of the larger Thingiverse community.

Conclusion

'What's in it for me?' For open source product design, this is the fundamental question that decides whether or not individuals will contribute to the survival of the project. In this article, we argued that the key to answering this question might not lie in what individuals gain from being part of the community (the resource focused, community-oriented approach), but to what extent individuals as part of the community experience and express ownership of the project (the activity focused, community-based approach).

(Re)applying the theory of the commons, we posit that open source product design projects would benefit from an approach that transcends the level of individual bargaining. Instead, it would aim to design a community around the project that can function as a commons – built with defined boundaries, linked with local conditions, based on appropriate governance principles, supported by relative independence, and able to actively interact with other projects as nested enterprises.

Such an open design project, as Michael Madison suggests, would result in a structured and built commons 'with formal and informal institutional mechanism in place to manage or govern [the] openness [...] distinguished from the unrestricted formal openness which defines the concept of the public domain in intellectual property law'.²⁵ Ostrom's principles help to guide the activities of creating, building, sharing, and preserving an open design through mass participation. The very notion of open design as a commons offers a valid solution for how to deviate from conventional business models and a market economy.

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²⁵ Michael Madison, 'Commons at the Intersection of Peer Production, Citizen Science, and Big Data: Galaxy Zoo', in Brett Frischmann, Michael Madison, Katherine Strandburg (eds) *Governing Knowledge Commons*, Oxford: Oxford University Press, 2014, p. 211.

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