Personal Fabrication

Designing a Business Model for the Next Digital Revolution

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About the Study

We studied business models of the Fab Labs around the world in a two-tiered approach. Firstly, a top-level description of the positioning of the 45 Fab Labs was derived through document analysis. Secondly, by selecting those Fab Labs with a comparative operational positioning we identified a subset of nine Fab Labs. Their business model approaches were considered relevant to the further development of a business model template for the Fab Lab innovation ecology. These business models were analyzed more deeply in expert interviews with the Fab Lab managers or, where applicable, with the business managers at their hosting organisations. The interview guideline addressed value proposition, revenue model, processes, resources, marketing, and innovation partnerships.

What is a Fab Lab

First there was a digital revolution in computation (personal computer), then in communications (convergence and mobile phones). The next digital revolution, according to MIT's Neil Gershenfeld (Gershenfeld 2005), is in the field of manufactured physical goods (personal fabrication). Gershenfeld and his colleagues have created so-called Fab Labs around the world: fabrication laboratories, equipped with digital fabrication machines (e.g. laser cutter, 3D router). Citizen inventors and tinkerers can use the Fab Lab for free or for a nominal fee to produce two- and three-dimensional parts that once could be achieved only using equipment costing hundreds of thousands of Euros. They use digital drawings and open-source software to control the machines. Fab Lab users share their ideas, designs and manufacturing experience with each other and with their counterparts at other Fab Labs around the world through web tools and videoconferencing.

Using the machines in one of these Fab Labs, children in inner city Boston have made saleable jewellery from scrap material. Villagers in India used their lab to develop devices for monitoring food safety and agri-cultural engine efficiency. Herders in the Lyngen Alps of northern Norway are developing wireless networks and animal tags so that their data can be as nomadic as their animals.

A Fab Lab works on the principle of 'open doors' (ana-logous to the open source movement). It has a true educational orientation: 'Do it yourself' is key at the Fab Lab. Users actively explore the contents, technologies and possibilities of the Lab themselves at their own pace, the entire workplace itself becoming as a com-munity based learning laboratory (Leonard-Barton, 1992). This is crucial to be able to live and understand visions and projections of the future that become possible through the Fab Lab. These experiments are the vanguard of a new science and a new era of 'post-digital literacy' in which we will be as familiar with digital fabrication as we are today with information processing.

In terms of activity theory (Engeström 1987), a Fab Lab is a community-based learning and enterprising environment that stimulates learning and development in three aspects: First, it is a 'make' place in which thoughts can be externalized and materialized, which is in itself an important learning mechanism (Leont'ev 1982). Second, it empowers communities that would otherwise often by cut off from the digital revolution to seek their own solutions. Third, and most important, it connects the unique, local Fab Lab communities into a networked ecology (Ward 1999) that through exchange of experience, expertise and knowledge, collective searching for solutions to emergent problems. In this innovation ecology, collaborative interaction of the enterprise and its stakeholders can produce the outcomes needed for today's high velocity, rapidly changing marketplace. It does so based on the paradigm of 'Commons Based Peer Production' that stems from successful projects such as Wikipedia, Open Source Software, Open Design (for a discussion see Helfrich, 2010).

Engeström, Y. (1987). Learning by expanding: An activity-theoretical approach to developmental research. Helsinki: Orienta-Konsultit.

Gershenfeld, N. (2005). FAB: The Coming Revolution on Your Desktop. From Personal Computers to Personal Fabrication. Cambridge: Basic Books.

Helfrich, S. (2010). The commons as a common paradigm for social movements and beyond. http://commonsblog.wordpress.com/2010/01/28/the-commons-as-a-common-paradigm-for-social- movements-and-beyond/, accessed 3 March 2010.

Leonard-Barton, D. (1992). The factory as a learning laboratory. Sloan Management Review, Fall, 23-38.

Leont'ev, A. N. (1978). Activity, Consciousness, and Personality. Englewood Cliffs, NY: Prentice-Hall.

Selected Results

Target vs. current main user group
N=9; multiple answers

	Students	General Public	Researchers	Companies
Target user group	9	8	8	6
Actual main users	8	5	1	1

Value Proposition of Fab Labs
N=9; multiple answers

	Infrastructure	Experts	Network of Fab Labs
Part of value proposition	9	6	4

Innovation Ecosystem of Fab Labs: Number of Partners
N=9

	0	1…5	6…10
Network partners	0	6	3
Industry partners	4	1	4
Sponsors	7	2	0

Interpretation

Data seems to indicate a distinction between Fab Labs that primarily offer the **lab as a production facility,** and those that are focusing on **supporting innovation.** Those who focus on offering innovation support provided a complete product-service-system that delivered the experience of effective and fast innovation to their users. Such Fab Labs accompanied their users on a certain section of their innovation journey – as opposed to the facility approach, which accompanies users merely during the time of their stay at the lab, their use of the equipment, and their experience of a well-run personal production process. The difference, hence, is not in the single elements of the offering, but the overall value proposition. For the Fab Lab as a facility, the value proposition is providing the best value in terms of the digital production processes; for the innovation Fab Lab the value proposition is providing the best outcome for its users and their innovation journey using the right mix of ingredients determined by the facilities and (networked) competencies available.

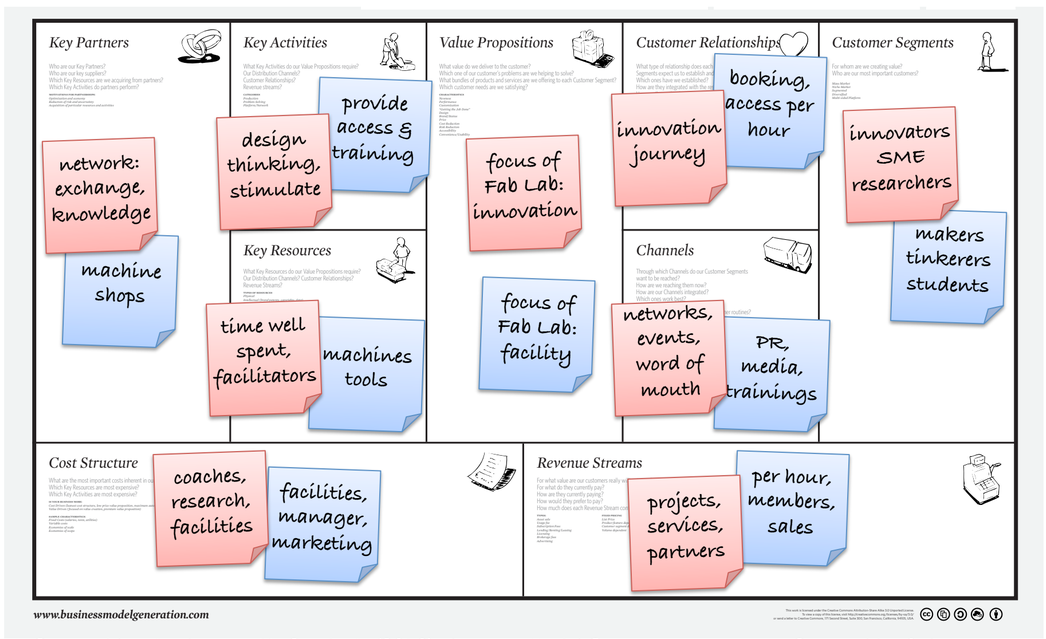
Production Facility

- use of production equipment
- personal production process
- facilities are core offering
- access
- expertise

Innovation Support

- product-service-system
- innovation journey
- networked competencies
- ecosystem partners
- facilities to support

Consequences for the Business Model



Osterwalder, A., Pigneur, Y., Smith, A. (2010). Business Model Generation. Lausanne: Osterwalder & Pigneur.

About the Authors

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