Show me the damn money!

Revenue model catalogue for open source hardware

V 0.13

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Revenue model catalog

This Revenue Model Catalogue is a collection of case companies that have made profitable open source hardware products, including a blank case-template sheet for readers to fill out and experiment with themselves.

The point is that other companies can learn directly from the cases, be inspired and get a better grasp of how they themselves can make open source hardware good business in their context.

Each case shows the company’s customer groups over a timeline of three phases, including:

- Innovators, early adopters and mainstream customers
- The key offering to each customer group
- The reason why these customers buy the product.

We then use color codes to show which revenue streams aka. Strategic Approaches, the company is mixing together to gain commercial success.

It is impossible to present all nuances of a business model in this short format, so readers should be aware that some complexity and nuance may have been left out to ease comprehension.

We hope you enjoy and get something useful out of this.

Open regards,
The Open Next team @ DDC - Danish Design Center
As discovered through OPENNEXT’s research, Open Source Hardware companies tend to combine six complementary strategic approaches in order to take their Open Source Hardware concept from early users to mainstream customers.

**Leverage through communities**
Gain momentum from early user/customer groups, and later you will potentially have a natural way to address more mainstream user/customer groups.

**Platforming**
Allowing suppliers of goods and services to connect directly with customers in order to cut out middlemen and learn about end-user needs directly from the source. Moreover, the control and influence you gain from owning the platform often surmount the value of being the entity that actually supplies the goods.

**Crowd- & third party funding**
From conventional efforts to attract angel investors and to go through seed rounds as defined by common norms to public funding such as grants and innovation support as well as private donations and crowd-funding, where customers and community members alike pay upfront for your product and service.

**Ecosystem infrastructure**
Digging one or several layers deeper than Platforming, Ecosystem infrastructure focuses on providing key enabling services or resources for users in a relevant ecosystem or professional industry.

**Selling hardware**
Make a good product that someone needs, and fulfill that need in exchange for money through sales either online or through retail.

**Consulting services**
Including; facilitating/hosting workshops, offering technical consulting either ad-hoc or on a subscription/retainer basis, co-development of new products with customers, and, lastly, offering full enterprise solutions.

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How others have succeeded with open source hardware.
We certainly don’t regret choosing an open source business model, as that is what allowed us to stand out and get ourselves established.

Massimo Banzi, Arduino, 2015

Open, simplified electronic prototyping
Arduino created a unique, low-cost and open source series of hardware microprocessors, that allow non-technical users to build basic electronic circuits using an intuitive software suite.

Deep customer participation
Arduino develops, manufactures and distributes the hardware together with full schematics and documentation to the public. This has allowed a large, global community to emerge around their products and added massive value for future users via user-generated libraries of useful code and guides etc.

Protecting trademark matters
Use of the Arduino brand name, led to inner conflicts when the product became successful and threatened the company. It could have been avoided by registering a trademark from the beginning.
How have their offerings evolved over time?

1. **Innovators**
   - Interaction designers
   - Artists
   - Students
   - Programmers

2. **Early adopters**
   - Schools
   - Universities

3. **Mainstream**
   - R&D Departments
   - Competitors (trademark license)

Electronics Experimentation boards
Open source hardware units and development software.

Starter kits and classroom packages
Subject specific packages with content and cloud software subscription options.

Arduino professional + brand licensing
Industry-grade hardware solutions with development consulting + licensing brand to competitors.

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1. **Innovators**
   - Standalone Arduino Uno board, Pete Prodoehl, [CC BY 2.0](https://creativecommons.org/licenses/by/2.0/), via Wikimedia Commons

2. **Early adopters**
   - Starter kit being used, Photo by [Spencer](https://unsplash.com) on Unsplash

3. **Mainstream**
   - SAS using Arduino based security system, Masakatsu Ukon, [CC BY-SA 2.0](https://creativecommons.org/licenses/by-sa/2.0/), via Wikimedia Commons
What are their Strategic Approaches?

- Consulting Services
  - €+
  - B2B consulting, helping companies integrate Arduino offerings.

- Ecosystem Infrastructure
  - €-
  - Developing free and easy to use development tools (SW/UX)

- Arduino

- Selling Hardware
  - €+
  - Selling Arduino branded electronic boards & kits through their own web shop.

- Leverage through Communities
  - €-
  - Supporting the community through forums, and events to gain insights.

What motivates the customer/user:

1. Innovators
   - User-driven support + use cases
   - Affordable + easy to use
   - Extensive documentation and guides

2. Early adopters
   - Emerging as a standard among learners
   - Convenient all-in-one offering
   - Vast project library + improved cloud based software

3. Mainstream
   - Existing code libraries ready to use
   - Trusted standard
   - Leading open solution provider
Precious plastic

“We share all information; code, drawings and source material. Online, for free.”

Dave Hakkens, Precious Plastic founder, 2017

A manufacturing ecosystem for recycled plastic
Precious Plastic is an open hardware plastic recycling project: It relies on a series of machines and tools which grind, melt, and inject recycled plastic, allowing for the creation of new products (and new local businesses) out of recycled plastic on a small scale.

Mission to use plastic waste as a resource
They design and develop machines to recycle plastic. For every product they tell the world how to replicate them, for free. They do this to come closer to a solution to the plastic waste problem. Precious Plastic is itself a company, and helps others to build recycling businesses.

Using open source for global impact
Many new companies have independently emerged based on Precious Plastics’ technology, concept and all-in-one guide to start a plastic recycling company. There is now a global network of businesses working together, like Precious Plastic Fiji, Plastplan (Iceland) and Precious Plastic Bangkok (Thailand) to name a few.
How have their offerings evolved over time?

1. **Innovators**
   - Plastic recycling pioneers

2. **Early adopters**
   - Entrepreneurs
   - Education institutions
   - Designers/artists

3. **Mainstream**
   - Business customers (B2B franchise takers)
   - Private customers (B2C)

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**Experimental machines with a mission**
Co-creating the first machines to tackle plastic waste, allowing co-ownership from participants and gaining unique insights.

**Full manufacturing system**
Offering a full system to reuse plastic from shredding it to shaping new products.

**Marketplace for machines & products**
Giving entrepreneurs a platform to sell both machines and consumer ready products.

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1. **Innovators**
   - Plastic shredder prototype.
   - Precious Plastic, CC BY-SA 4.0

2. **Early adopters**
   - Plastic production machines.
   - Precious Plastic, CC BY-SA 4.0

3. **Mainstream**
   - Earrings sold at the Bazaar (Marketplace).
   - Precious Plastic, CC BY-SA 4.0
What are their Strategic Approaches

What motivates the customer/user:

1. **Innovators**
   - Strong sustainability action agenda
   - Cheaply available manufacturing system
   - Giving opportunity for co-ownership and contributing to the cause

2. **Early adopters**
   - First-movers gain access to plastic recycling experts
   - More machine variants available through suppliers
   - Possibility for minor-scale business to sell recycled plastic

3. **Mainstream**
   - A local presence in a global community to create an environmental impact
   - Molds and specialized machines available
   - Marketplace for machines (B2B) and products (B2C)
XYZ Cargo

Empowering your local community to build or buy the bike they love and need, is not just sustainable and socially just, it is also a good self-sustainable business. Open source is a key component in our exploration of that.

Till Wolfer, co-founder XYZ Cargo, 2021

Cargo bikes for all needs
XYZ CARGOs use a completely new way of building functional cycles with a focus on local production in a socially just and environmentally sustainable way. They are based on an Open Source construction system called XYZ SPACEFRAME VEHICLES (CC BY-SA-NC 3.0).

Modular construction
XYZ CARGOs combine bolted, modular and simple rectangular construction methods with the use of advanced 3d design tools. XYZ CARGOs are easy to customize and to rebuild. It encourages DIY ingenuity and participation instead of rigid predefined solutions.

A physical Shareware approach
Operating under a non-commercial license which requires anyone that wants to resell copies to contact XYZ CARGO and get a sub-producer agreement. XYZ CARGO and other contributing designers receive a fair license fee from every sold bike, which affords them to offer free plans for the ONESEATER, CARGO ADD-ONS and other OSH products N55 & Till Wolfer keep developing.
How have their offerings evolved over time?

1. **Innovators**
   - Open source hardware pioneers
   - DIY enthusiasts

2. **Early adopters**
   - Urban commuters

3. **Mainstream**
   - Small street vendors

**DIY Bikes for enthusiasts**
The XYZ CARGO ONESEATER is an open source project that experiments with the Space Frame construction developed by XYZ Cargo. A free DIY-manual is available.

**Modular bikes for unique use-cases**
Hand built using the unique modular XYZ SPACEFRAME construction principle to create; XYZ CARGO BIKE, TRIKE, FOURWHEELER and more. All models can be easily adapted to individual needs.

**Creating bike platforms for entrepreneurs**
Regardless if you sell transportation services, coffee or even pizza, XYZ develops bikes for entrepreneurs that require a mobile workstation.

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**1. Innovators**

XYZ Cargo Oneseater.
XYZ Cargo, CC BY-SA 4.0

**2. Early adopters**

XYZ Cargo Fourwheeler with box.
XYZ Cargo, CC BY-SA 4.0

**3. Mainstream**

Pizza bike made in OPENNEXT project.
XYZ Cargo, CC BY-SA 4.0
What are their Strategic Approaches

Micro-factories can access XYZ CARGO full building knowledge & sales channels through a “fair-share” license agreement with XYZ CARGO.

What motivates the customer/user:

1. Innovators
   - Becoming a first mover in a community of bicycle innovators.
   - Professional design and assembly guidance.
   - Design and assembly guide (BOM) freely available. (only XYZ CARGO ONESEATER)

2. Early adopters
   - Purchasing a bicycle that is made for their purpose.
   - Assortment of standard bikes easily customizable.
   - Trust via Local manufacturing sites in Copenhagen and Hamburg.

3. Mainstream
   - Uniquely flexible and easily customizable to any street vendor’s purpose
   - Co-development support from XYZ Cargo themselves and the community
   - Extended local trust with manufacturing locations in Paris and Barcelona.
   - Convenient, intuitive online configurator for easy customization

€+ Revenue
€− Investment

Leverage through Communities
Investing in community outreach and finding the target audience

XYZ Cargo

Ecosystem Infrastructure

Selling Hardware
Selling handmade bicycles

Investing in community outreach and finding the target audience

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Investing in community outreach and finding the target audience

Ecosystem Infrastructure

Selling Hardware
Selling handmade bicycles

Investing in community outreach and finding the target audience
We never had resellers so we were always in direct contact with the customers in the community and this proved very important for us because you have instant feedback from the people.

Josef Průša, founder Prusa Research, 2021

The most used 3D-printer in the world
The Prusa i3 series consists of open-source fused deposition modeling 3D printers, manufactured by Czech company Prusa Research under the trademarked name Original Prusa i3. A derivative of the infamous RepRap project, Prusa i3 printers were named the most used 3D printer in the world.

Developed and built all over the world
Since the i3 series is open source, there have been many variants produced by companies and individuals worldwide.

From humble beginnings to large-scale manufacturing
Prusa Research maintains a ”print farm” of 585 3D printers (as of January 2021) to manufacture plastic parts for Original Prusa branded products.
How have their offerings evolved over time?

1. Innovators
   - The Rep Rap (DIY 3D Printer) community

2. Early adopters
   - Hobbyists
   - Developer community

3. Mainstream
   - R&D Prototyping Departments
   - Maker Spaces
   - Schools/Universities

The ‘Ford Model-T’ of 3D printers
Josef Průša, a core developer of the Open Source RepRap 3D printer, adapted and simplified the RepRap Mendel design, reducing the time to print 3D plastic parts from 20 to 10 hours.

Simplifying access to 3D printer kits
Prusa Research released an i3 full kit under the brand name “Original Prusa i3” after having realized that there was a market for 3D printer kits.

The trusted industry standard for 3D printers
Prusa Research continues to develop and sell both filament- and resin printers, offering best in class prints for whatever your need is.
What are their revenue streams?

Prusa Research

- **Ecosystem Infrastructure**
  - Publishing printer SW and HW documentation
  - Extensive community for support and help with print quality.
  - Great attention to quality in their assembly kits available for purchase.
  - Further interaction with the wider 3D printing community through Prusa funded MakerSpace and events.
- **Selling Hardware**
  - Selling parts, kits and complete 3D printers
  - Complete filament and resin printers that offer best in class prints.
- **Leverage through Communities**
  - Investing in community outreach & services
  - Platform to share and download 3D models and assembly instructions

**What motivates the customer/user:**

1. **Innovators**
   - Prusa credibility through community participation and design validated by several hobbyists
   - Parts to make your own printer.
   - Open designs to halve the print time for DIY RepRap printers, freely available

2. **Early adopters**
   - Extensive community for support and help with print quality.

3. **Mainstream**
   - Further interaction with the wider 3D printing community through Prusa funded MakerSpace and events.
   - Complete filament and resin printers that offer best in class prints.
SparkFun Electronics

“Pick one thing and nail it. SparkFun doesn’t do consulting or contract manufacturing; we just design and manufacture cool products for people who are excited about building electronics projects.”

Nathan Seidle, Founder SparkFun Electronics, 2018

Electronics for building community
SparkFun Electronics is an electronics retailer that manufactures and sells micro-controller development boards and breakout boards based on a set of values that embrace community building through transparency, accountability and mutual respect.

Helping people of all skill levels
Regardless of skill level, their open source components, resources, and online tutorials are designed to broaden access to innovative technology and make the road to a finished project shorter.

Scaling from humble beginnings
SparkFun has scaled dramatically, yet in an organic way. It went from one guy mailing boxes out of a basement to 140 employees in an 80,000-square-foot building.
How have their offerings evolved over time?

1. **Innovators**
   - University students locally in Colorado

2. **Early adopters**
   - Students in local schools
   - Makers in hackerspaces
   - Participants at electronics events

3. **Mainstream**
   - Students worldwide
   - Hacker Youtubers
   - Engineers at R&D Departments
   - Researchers demonstrating principles

Selling affordable electronic programmers
Sparkfun sold products that were hard to get or use. Programmers could be purchased from a few different places, or you could buy everything from SparkFun and know it would work together.

Developing own boards/sensors for prototyping
Analog Devices had released the ADXL320 accelerometer. Their evaluation board was $450. SparkFun released the ADXL320 breakout board for a tenth of the price.

An entire ecosystem to enable any electronic projects.
Enabling anyone to get into electronic projects, ranging from robotics, home automation to electronics for clothes/fabric projects.

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SparkFun webshop for electronics (2011).
SparkFun Electronics, [CC BY 2.0](https://web.archive.org), via sparkfun.com

SparkFun ADXL320 breakout board (2004),
SparkFun Electronics, [CC BY 2.0](https://web.archive.org), via sparkfun.com

Os & Xs game for LilyPad Arduino using conductive velcro
Rain Rabbit, [CC BY-NC 2.0](https://flickr.com), via Flickr
What are their Strategic Approaches

SparkFun Electronics

- Creating documentation and how-to's
- Ecosystem Infrastructure

- One-stop-platform for electronic tinkerers
- Leverage through Communities
- Engaging in community and creating events

- Selling Hardware
- Selling third party- and self developed products for all hobby project needs

- Customer buy-in for new offerings
- Crowd- & Third Party Funding

- Extensive online one-stop-shop platform/webstore.

- Massive community forum board for peer-to-peer support, intriguing events and competitions that engage.

What motivates the customer/user:

1. **Innovators**
   - Online one-stop-shop platform/webstore for hard to come by parts.
   - Detailed documentation of how to use the products.

2. **Early adopters**
   - Convenient online one-stop-shop platform/webstore for everything you need to prototype.
   - Breakout boards developed by SparkFun at a fraction of the cost of most alternatives.

3. **Mainstream**
   - Open license + crowdfunding empowers customers to have a say in new product development and launches.
   - Complete product kits and specific categories to create any project.

- Revenue
- Investment

€+ Revenue
€- Investment