

# The Significance of Open Source Hardware

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*Open source hardware is hardware whose design is made publicly available so that anyone can study, modify, distribute, make, and sell the design or hardware based on that design. The hardware's source, the design from which it is made, is available in the preferred format for making modifications to it. Ideally, open source hardware uses readily-available components and materials, standard processes, open infrastructure, unrestricted content, and open-source design tools to maximize the ability of individuals to make and use hardware. Open source hardware gives people the freedom to control their technology while sharing knowledge and encouraging commerce through the open exchange of designs.*

— The Open Source Hardware Definition

## **=Personal=**

- Allows us to (re)shape the artifacts we use and in this way shape our own experiences - as opposed to allowing artifacts to determine what we can do and how we can do it.
- Allows us to understand how artifacts work and how they are made and in this way teaches us how things work (technological literacy).
- Fosters creativity by lowering the barrier to the creation and modification of physical artifacts.
- Fosters peer-to-peer communication, collaboration and community, and with these a sense of belonging and connection.
- Fosters self-reliance and resilience by allowing us build and repair artifacts on our own or in collaboration with others.

## **=Business=**

- Allows companies to innovate faster by providing access to prior work and crowdsourced contributions.
- Ensures that derivatives and innovations built on open source designs (and released with a share-alike clause) must also be shared publicly, thus everyone benefits from advancements and improvements devised by external contributors and competitors.
- Allows consumers to modify, customize, remix and mashup products to create custom solutions for their specific needs (as opposed to one-size-fits-all). This benefits both consumers - who can obtain exactly what they need - and companies - whose customers are more satisfied.
- Provides valuable market and usability information from voluntary customer suggestions and modifications.
- Allows for better products as the more numerous and diverse the contributions to a design the more wholesome and inclusive it can be (“given enough eyeballs all bugs are shallow”)

- Allows for lower costs in customer support as customers themselves will often generate and share a wealth of information and troubleshooting tips.
- Lowers internal research and development (R&D) costs through distributed R&D (customers and competitors contribute to R&D). Lowers opportunity cost of non-transparency.
- Reduces expenses in patents, trade secrets, and other legal costs of secrecy and exclusivity.
- Allows for cheaper products by reducing competitive waste - via distributed R&D and absence of the high costs typically associated with secrecy and exclusivity.
- Increases public trust in businesses and brands due to the open and transparent nature of the open source model.

### **=Economics=**

- Encourages distributed and decentralized production, along the lines of Jeffersonian democracy, more consistent with human needs than centralized production.
- Improves access to production capabilities through the application of the open source approach to the design and distribution of sophisticated processes and production tools (laser cutters, 3D printers, etc.).
- Lowers the barrier to entry into manufacturing by not exercising the right to exclude (as patents do) and thus fosters the emergence of a greater number of small and medium producers resulting in a broader and more diverse ecosystem.
- Allows for import substitution via production based on local resources by promoting substitution of global supply chains with local feedstocks.
- Encourages collaboration between enterprises and increases interoperability via access to common building blocks of design.
- Enables local production of artifacts where and when they are needed. This is particularly relevant for disaster areas and isolated regions of the world where local production may be the only option.
- Compels businesses to compete based on innovation, quality and price - instead of exclusive rights - thus benefiting consumers and encouraging rapid innovation.

### **=Education & Learning=**

- Enables informal and independent learning. This is particularly relevant in parts of the world where formal education is costly or otherwise inaccessible.
- Provides both formal and informal education organizations, regardless of their budget or location, with plans and knowledge with which to teach design, engineering and science.

### **=Sustainability and Regenerative Design=**

- Promotes modular, interoperable design standards by promoting external R&D collaboration between enterprises.
- Promotes integrated systems design by allowing a larger number of stakeholders to collaborate in the design process.

- Promotes closed-loop manufacturing cycles by increasing potential for involving additional contributors.
- Allows for products to be manufactured when and where they are needed (decentralized production) thus decreasing waste and pollution associated with transportation, storage and surplus.
- Allows us to repair devices and other artifacts thus extending their life-cycle and reducing waste.
- Enables longer life-cycles of artifacts as the special attachment we form with the artifacts we build ourselves ([the IKEA effect](#)), either from raw materials or kits, provides an incentive to keep and repair them.

### **=Social=**

- Encourages collaboration and sharing, thus strengthening social ties, as well as promoting debate and diversity.
- Acts as a democratizing agent by distributing production-related knowledge across class borders.
- Promotes a shift from a society of passive consumption to one of proactive production.
- Makes possible the emergence of an equitable economic system in which access to knowledge is no longer what separates those who can produce from those who can't.
- Promotes an economy of affection - an economy based on interdependent community relations.
- Increases trust between all participants based on the open nature of the model.
- Helps form knowledgeable, curious and proactive citizens.

### **=Political=**

- Encourages political engagement by providing participation tools for voices to be heard via open software/hardware platforms.
- Fosters democratic participation in the construction of our environment by allowing everyone to contribute.
- Eschews top-down approaches and replaces them with a more active public sphere.
- Reduces conflict over resources by enabling ubiquitous access to knowledge of how to produce goods.
- Promotes economic self-determination by lowering the barriers to entry into production.

### **=Cultural=**

- Promotes cultural diversity and specificity by encouraging place-based solutions to problems.
- Reduces cultural homogeneity (Coca-Colonization of the world) by encouraging local adaptation of product designs.