



# HOW TO START A 4-H FABLAB



THE UNIVERSITY OF ARIZONA  
**Cooperative Extension**





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4-H Youth Development  
4-H Fab Lab Guide**

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# How to Start a FabLab

## **What is a FabLab?**

A Fab Lab is a workspace, open to the community it serves, with the technology and tools to allow users to make almost anything. FabLabs has a core inventory of machines and tools and participates in the global network of other FabLabs around the world to share information, ideas, and to support all FabLab users in their creative enterprises. The FabLab concept is a creation of Massachusetts Institute of Technology's Center for Bits and Atoms.

## What makes a Fab Lab?

There are four components of a Fab Lab:

- 1. The lab must have public access.** The Fab lab must be open to the public at least part of the time each week. FabLabs supported by University of Arizona Cooperative Extension's 4-H program must serve youth development goals.
- 2. The Fab Lab must subscribe to the Fab Charter,** outlined below:

**The Fab Charter (Courtesy Fab Foundation <https://fabfoundation.org/>)**

*What is a fab lab?*

Fab labs are a global network of local labs, enabling invention by providing access to tools for digital fabrication.

*What is in a fab lab?*

Fab labs share an evolving inventory of core capabilities to make (almost) anything, allowing people and projects to be shared.

*What does the fab lab network provide?*

Operational, educational, technical, financial, and logistical assistance beyond what is available within one lab.

*Who can use a fab lab?*

Fab labs are available as a community resource, offering open access for individuals as well as scheduled access for programs.

*What are your responsibilities?*

*safety:* not hurting people or machines

*operations:* assisting with cleaning, maintaining, and improving the lab

*knowledge:* contributing to documentation and instruction

*Who owns fab lab inventions?*

Designs and processes developed in fab labs can be protected and sold however an inventor chooses, but should remain available for individuals to use and learn from

*How can businesses use a fab lab?*

Commercial activities can be prototyped and incubated in a fab lab, but they must not conflict with other uses, they should grow beyond rather than within the lab, and they are expected to benefit the inventors, labs, and networks that contribute to their success

3. **Fab labs have a common set of tools and processes** so that all Fab Labs can share ideas and knowledge. Fab labs anywhere should be able to reproduce processes and create products in a similar way using the same basic set of tools and equipment. FabLab can be considered “full” if they have a permanent location and most if not all the recommended equipment, “mobile” if the fab lab can be transported around, and “mini” if the fab lab has a smaller amount of hardware in a smaller space. Fab labs *typically* include the following ( list courtesy of the Fab Foundation <https://fabfoundation.org/> ) -
  - a. A laser engraver that makes 2D and 3D structures
  - b. At least one 3D printer
  - c. A vinyl cutter
  - d. A circuit board milling machine that makes circuit boards, precision parts and molds for casting
  - e. A large wood router for building furniture and housing
  - f. A set of shop tools and a workbench
  
4. **FabLabs must participate in the larger, global FabLab network** by being a part of the knowledge sharing community. Examples include video conferencing with other lab spaces, attending the annual FabLab conference, participating in [Fab Academy](#) (2) , or partnering with other labs on projects and/or challenges.

## Step by Step Process for Starting a Fab Lab

Please reach out to the contacts listed in this document to help you with this process! Fab Foundation "Getting Started" page is a suitable place to start. A more detailed guide can be found in the detailed guide ‘FabLab Guide - How to Set up Your Lab and Maximise Its Impact’ (3) which can be found in the works cited section here. (Courtesy of the Fab Foundation <https://fabfoundation.org/> )

1. **Identify a host agency** to take ownership of the Fab Lab. The host agency can be a school, extension office, or community organization. The Fab Lab needs to be hosted, housed, and owned by this agency.
2. **Identify the right Champion** to lead the Fab Lab. This is the person who will be responsible for the day-to-day operations of the Fab Lab and should be knowledgeable

about the basic technology in the Fab Lab and be passionate about community development. This person should be trusted and respected by the community.

3. **Finalize the partnership** and contractual agreements. This process should involve the host for the FabLab, the FabLab foundation and any other sponsors and partnership that are funding the project.
4. **Secure Funding** for the Fab Lab. Reach out to the Fab Lab Foundation, University of Arizona Cooperative Extension 4-H team, and others in the community to help secure funding for the site.
5. **Identify and secure the site** of the Fab Lab- The potential site should be easily accessible to the community and be part of a host agency that shares the same mission. There are sample plans available for [full](#) and [mobile](#) versions of FabLabs.
6. **Procure and Install Fab Lab** at site- see existing plans for reference and contact Arizona leaders to help you with their already completed plans that may be able to be replicated. Don't work from scratch! You may also contact the FabLab foundation for design and installation support.
7. **Train the trainers.** The champion and other knowledgeable stakeholders need to increase the potential of the Fab Lab by training youth leaders in the basic technology and operation of Fab Lab equipment so that they can train other users of the FabLab. The FabLab foundation offers professional development training for educators. The University of Arizona Cooperative Extension 4-H State Program is also developing training for fab lab facilities- contact the State 4-H office for more details.
8. **Identify Projects.** Start with local problem solving. What issues are there in the community that could be addressed with the resources in a FabLab? The more input you have, the more ideas will be generated that could lead to projects. More information on how a FabLab can serve community needs can be found in the works cited: [FabLabs in Vulnerable Communities](#) (4). You can also have youth apply for Fab Academy (2), where each week participants are instructed in building a new project to rapidly gain skills with FabLab software, hardware, and design strategies.
9. **Launch the Fab Lab!** Invite all stakeholders and open it up to the community. Identify the projects that are planned and the problems solving nature of the Fab Lab model. Make it a public celebration to spread the word on this amazing community resource.
10. **Create and refine a schedule** that works for stakeholders and maintain contact with the Arizona and global FabLab networks. The hub for information about FabLabs supported by University of Arizona Cooperative Extension 4-H is <https://extension.arizona.edu/fablab>.



## Arizona Resources List

1. The Fab Foundation- [fabfoundation.org](http://fabfoundation.org)
2. University of Arizona Cooperative Extension 4-H State Office- [extension.arizona.edu/4h](http://extension.arizona.edu/4h)
3. University of Arizona Cooperative Extension FabLab website- <https://extension.arizona.edu/fablab>
4. Your county or tribal Cooperative Extension office  
<https://extension.arizona.edu/locations>

## Works Cited

1. Various Authors. *The Fab Foundation*, Massachusetts Institute of Technology's Center for Bits and Atoms, 30 July 2009, <https://fabfoundation.org/>.
2. Various Authors. Fab Academy, Massachusetts Institute of Technology's Center for Bits and Atoms, 3 Aug. 2018, <https://fabacademy.org/>.
3. Johns, Jennifer. "FabLab Guide - How to Set up Your Lab and Maximise Its Impact." *Issuu*, University of Bristol, 18 Dec. 2018, [https://issuu.com/j\\_johns/docs/bu\\_fablabs\\_document\\_final?e=35968760%2F66510214](https://issuu.com/j_johns/docs/bu_fablabs_document_final?e=35968760%2F66510214)  
.
4. González-Nieto, Noé Abraham, et al. "FabLabs in Vulnerable Communities: STEM Education Opportunities for Everyone." *International Journal on Interactive Design and Manufacturing (IJIDeM)*, Escuela De Humanidades y Educación, Tecnológico De Monterrey, 6 Nov. 2020, <https://link.springer.com/article/10.1007/s12008-020-00744-y>.