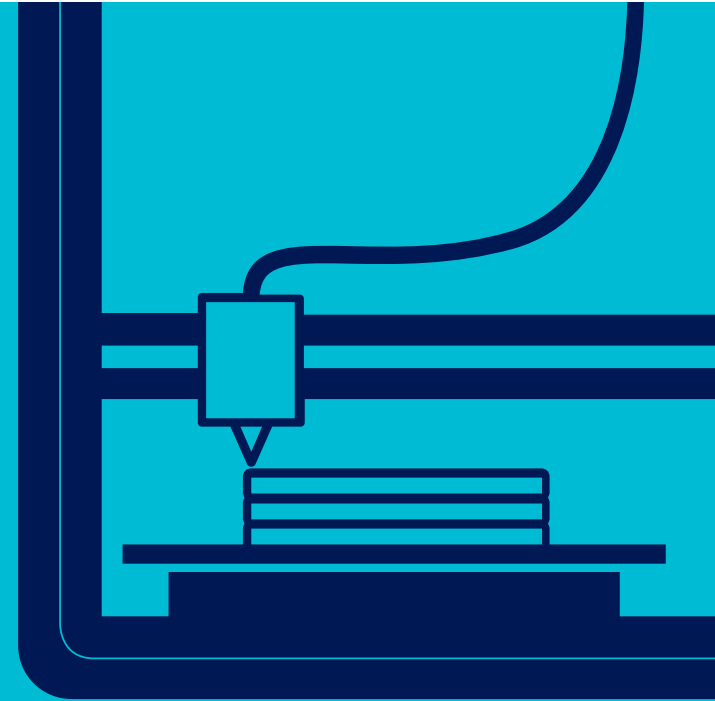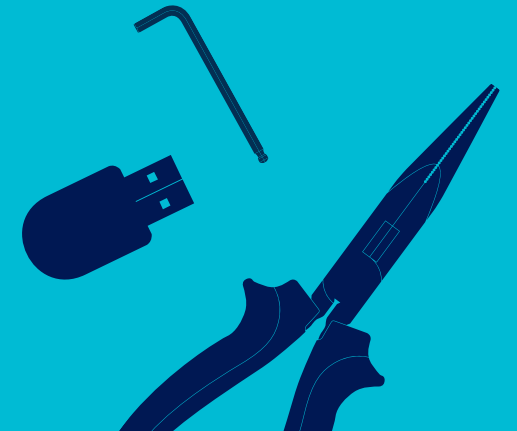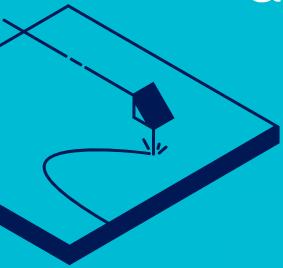# EUROPASS TEACHER ACADEMY

MAKERSPACE

How to set up your lab
and maximise its impact

Making motivations

- formalising an existing Makerspace

- to help regenerate places, communities and neighbourhoods

- to provide services to the local community

- to educate new Makers

- to advance knowledge of digital technologies and explore new possibilities

- to support research and development and upgrade knowledge in existing disciplines

- to provide services to existing industries, especially in prototyping and innovation

a space focused on digital fabrication, community engagement and impact.
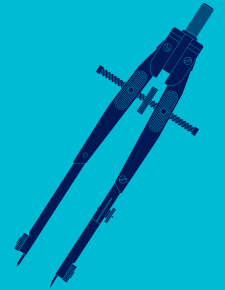
Who or what is a Maker?

'I'm a Maker because I make things'

'I'm a tinkerer'

'A Maker is someone that makes rather than buys. Or creates rather than buys'

'I make things and I think I'm reasonably good at it'

'I'm a Maker because I teach myself how things work'

Making motivations

They participate in the 'Maker Movement' which extends the 'do it yourself' culture into creating new objects and re-purposing existing ones.

Spaces for Makers vary in how they are run and the types of equipment they have.

Some are more commercialized, aiming to help entrepreneurs make prototypes they can commercialize, others are a venue for hobbyist Makers to hang out. Techshops used to be the most advanced in terms of tech offered and were based on a membership model. They closed down in 2017 leaving the future of community based digital fabrication in the hands of FabLabs and Makerspaces.

innovate

fun

play

sustain · grow
wellbeing · advance

live

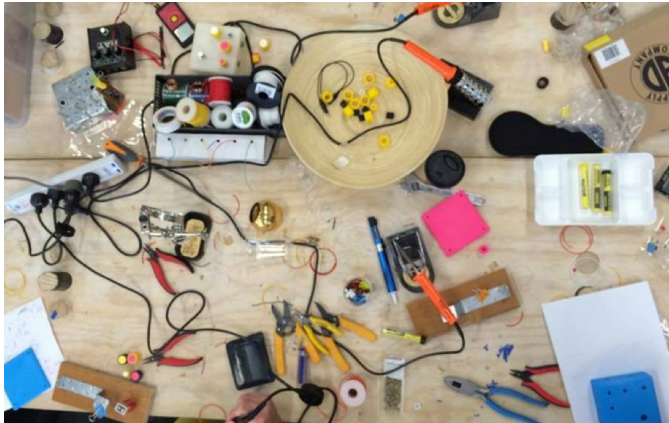exchange · make
fail · cut · digital
friends · educate

future fork ·
internet · code ·
print · experience

learn

invent · share
knowledge ·
entrepreneur

Making motivations

Typology of Makerspaces

Social impact

Technology

Commercialization
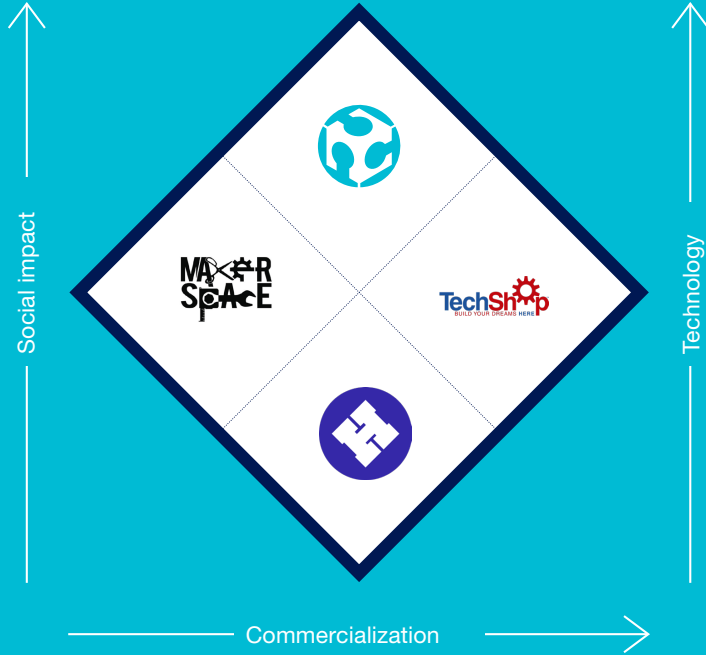
What is 'open source' and what does it mean for Makerspace?

Originally the term 'open source' referred
to a computer programme in which the
source code is available for all to use,
and enables modification from its original
design. In the context of Makerspace, this
means that much of the equipment and
the designs are open source – they can be
modified, thereby enhancing the potential
of the technology and user engagement.
The open
source philosophy means that when users
have used free, public time in the Makerspace
they are strongly encouraged to make thei
r designs available to other users so that all
can learn from each other.
As Makerspaces have been demonstrating
for quite some time, contemporary 'open
source' includes hardware as well as
software tech and no tech tools.
This is where the cutting edge is

"Most innovation is
 happening in upstream,
 open source communities...
 (going) beyond software,
 it's the font of innovation
 for technology."

Tim Yeaton, Red Hat

WikiHouse

The WikiHouse project is an open source project designed to reinvent the way homes are made. The aim is to use digital manufacturing to make it possible for anyone to download and 'print' customised, low-cost, high performance houses.

❯ https://wikihouse.cc

FabLab Beehive

Concerned with declining bee numbers, the FabLab Barcelona at IAAC has fostered a distributed team of designers and developers to produce open source beehive designs. Either can be freely downloaded, installed to a CNC router machine and cut from a standard 4x8 sheet of material. The fabricated pieces slot together without the need for screws and glues. To date there are more than 60 hives in over 20 countries.

❯ https://iaac.net/research-projects/self-sufficiency/open-source-beehives

There is also a sensor kit that creates open source data regarding the healthiness of the hive, so researchers can monitor the hive. The project is about more than just the technology. It has an important role in bringing communities together around the beehives.

❯ www.osbeehives.com

📷 Example of an OSBeehive.
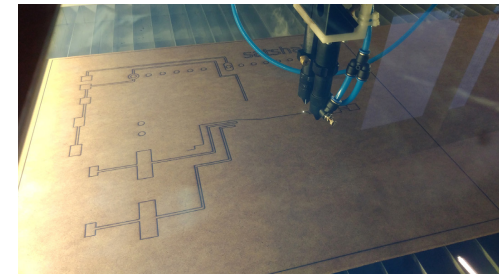
📷 The Open Source Dual Laser Cutter.

LaserDuo

LaserDuo is an open source laser cutter machine designed and built by Daniele Ingrassia and his team.

Developed and built in FabLab Kamp-Lintfort as a multipurpose machine, LaserDuo allows access the laser cutting technology at lower price in comparison to similar machines available on the market.

❯ http://laserduo.com

Planning and permissions

Planning and permissions

Location, location, location!

It is crucial to consider exactly where the best location is for each Makerspace.
In theory a Makerspace can be located anywhere, but each lab needs to attract users (both the public and businesses). It may be challenging if you are some distance from urban areas, but there are examples of successful rural Makerspace.
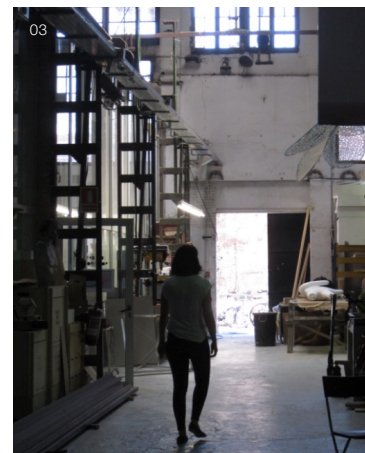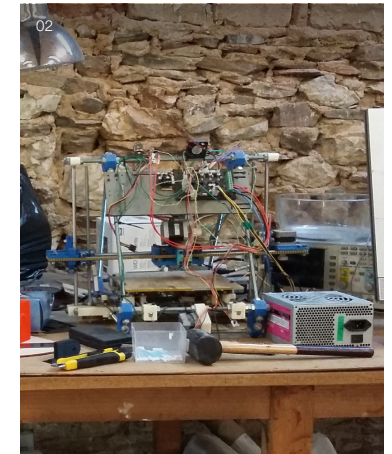
Planning and permissions

The closer a lab is to public transport
and / or parking the easier it will be for users to get to the lab,
and to transport materials for their projects.
You may want to investigate sharing a space,
for example setting up a makerspace
 in a public building like a library.

Planning and permissions

Examples of different types of Makerspace partnerships

There are strong corporate partnerships with Chevron, GE Foundation, Airbus and SolidWorks. These partnerships create new labs and support resources and programmes in existing labs. Other examples include Creative Lab in Guyancourt, France (with Renault) and FabLab Bristol, in the UK (with Saint-Gobain).

Think about the following factors:

01

Cost per square metre for your space. It is likely that the closer you are to the centre of urban areas, the more expensive space will be. Strike a balance between a central location and having more space in your FabLab.

02

Proximity to public transport and / or parking facilities.

03

What kind of space is going to attract local users (i.e. tidy modern office space or dirtier warehouse-type space)?

04

What facilities do you need? A toilet is essential if you expect users to stay for more than a few hours. Check what regulations you need to adhere to.

05

It is unlikely you can buy the space so you are likely to rent. Over what terms can you rent? What commitment can you make? Find out what changes you are allowed to make to the space.

Sources of revenue and support

Setting up a makerspace involves an investment of time and money.

It is likely that your FabLab will need to use all the listed income streams to survive.

Type of funding	Advantages	Disadvantages
Public i.e. Grants	– Public grant money unlikely to have to be repaid. – Likely to connect to broader schemes and initiatives that can boost the FabLab. – Grants can be a driving force. They are often service or programme oriented so look for alignment between the grant organisation and a program you want to start. – Sustainability can come in the long-term if you are able to develop long-term, trust relationships with Corporate Social Responsibility departments or Foundations for which you partner on programs and services.	– Difficult to be sustainable. – What happens after the grants run out? – Time consuming to be chasing grant revenue (and many will not be successful). – Dependent on funders understanding what FabLabs are and what they can offer.
Membership Fees	– Can bring relatively consistent income. – Ties users to the FabLab and they are more likely to attend if they are paying a fee.	– FabLab may receive less users compared to free use. – Costs associated with managing the membership scheme, including substantial efforts in advertising and marketing to keep new users coming in.
Education i.e. University. Can be private or public. Can also be a lab doing professional development	– Consistent income and resources to invest in people and equipment. – May also come with strong existing brand and reputation.	– Much lab time will be taken up with education for students. – Typically there is less public open access to the FabLab.
Private Funding i.e. Loans	– Working with private companies may bring other advantages such as sponsorship and / or commercial work income. – Make sure there is a clear understanding with private companies about expectations of the FabLab. – Can bring good publicity.	– Risky, avoid personal investment of finances. – How to pay back loans? Is the business model secure enough?
Fees for Services	– Maximises existing resources (the skills and knowledge of your staff). – It increases engagement with local businesses and their staff. – Provides access to information on how Fab technologies are being used in prototyping and innovation in different industrial sectors. It is exciting!	– It requires a high investment of staff time. – Many clients will want private, dedicated time in the Lab which reduces time open to the public. A balance needs to be found. – You will have to ensure confidentiality and IP protection.

Sources of revenue and support

Commercial revenues

Most FabLabs provide services for private companies who need digital fabrication and / or consulting on prototyping new designs and concepts. This can be an excellent source of revenue and working with businesses can be interesting and mutually beneficial.

As with membership fees, there is no set FabLab rate, but most labs publicise their rates. You need to work out what price your FabLab's services can command.

Some FabLabs conduct small scale manufacturing in off-hours for local companies. In Ghana they make dog tags on the laser cutters for the local government; in Kenya they prototype and manufacture small medical devices; in Tulsa Oklahoma (US) they help local entrepreneurs design and manufacture products related to motorcyles.

Do you incorporate the FabLab as a Limited or Inc company? Or do you set up as a charity?

There will be pros and cons of each – investigate this in your own country context.
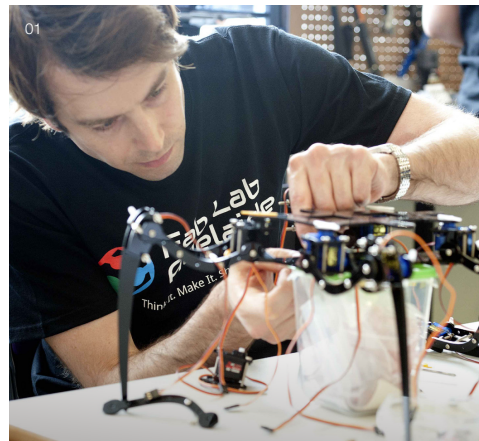
Have you thought about setting up an Advisory Board?

This is a group of interested people who can help support the lab. You could include individuals from public funding bodies, local businesses and experienced Makers.

01 Work in progress at the South Australian Makers Inc.

02 Smartphone cases. Image courtesy of EOS.

Sources of revenue and support

Types of support: remember that there are many sources of support.

Emotional

Use your personal and social networks.

Financial

Explore all options open to you and try to have multiple funding sources.

Technological

You are part of a much bigger community. You can draw on the Fab Foundation, your regional Fab Network, and other FabLabs in your country for support. You are also part of the Maker Movement and can connect with other Makerspaces.

FabLab connect:
❯ www.fablabconnect.com

Photos left to right by freestocks, Neil Thomas and Kyle Glenn on Unsplash.

Sustainability

A key question is around Sustainability. It is a challenge to keep FabLabs running after initial funding runs out.

You need to think about long-term sustainability from day one in planning your FabLab. Find your long-term stakeholders and partners. There are many models in both the Maker and Fab Networks.

But realise that making your own model is a highly customised process, dependent on your stakeholders and the needs and interests of your community.
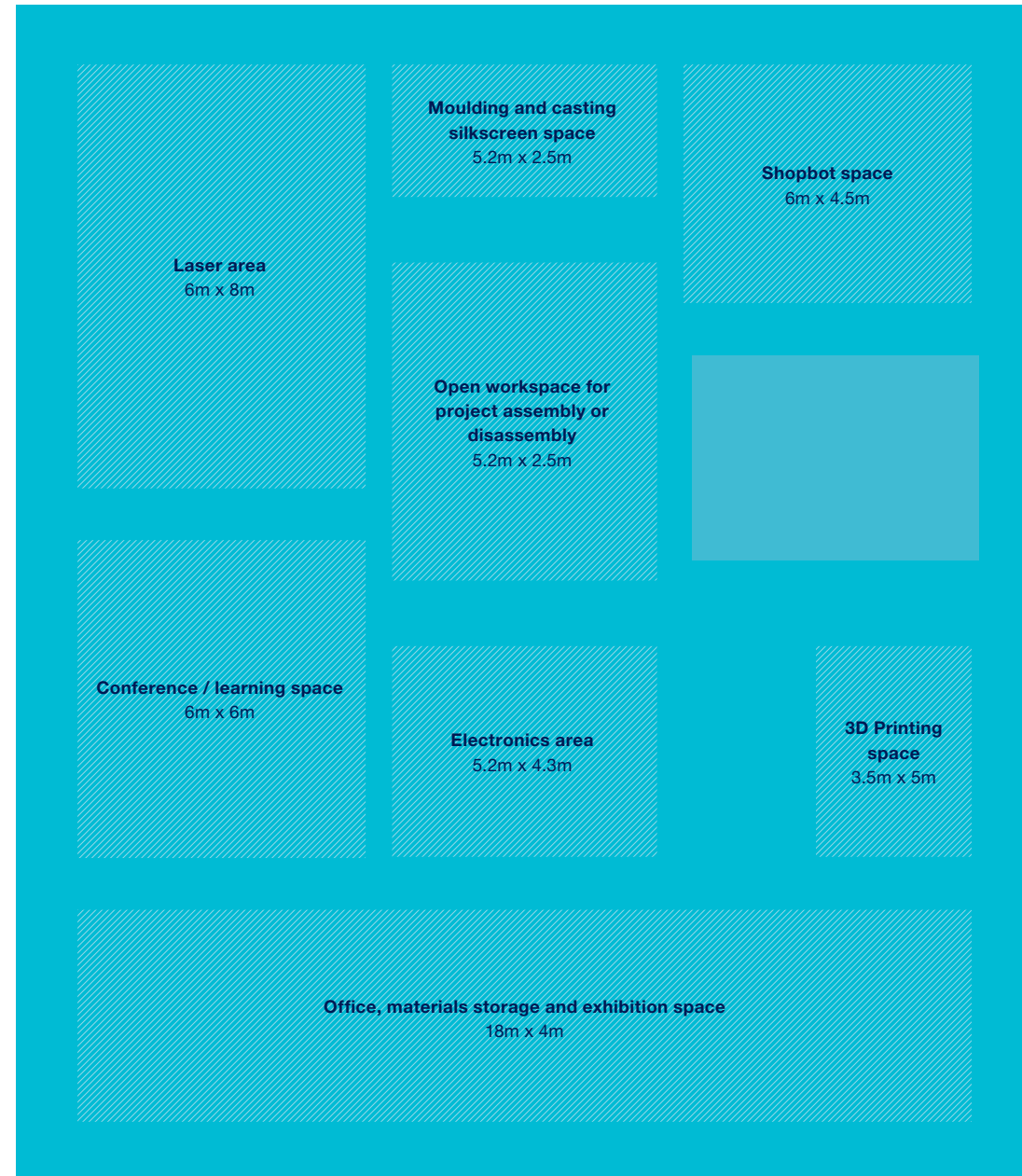
Setting up:
equipment and space

What type of environment?

Many digital technologies are relatively clean so FabLabs don't necessarily have to be in workshops. Many FabLabs are in spaces that resemble offices. It is advisable to think about the following factors:

01 How much space do you need? How much can you afford? Do you include electronics components, high-precision milling machines for circuit board creation and computers for programming?

02 Where will you put the equipment? How do you anticipate users using the space? Does some equipment need to sit together or apart (due to noise or the generation of dust and fumes)? You don't want particles in the air around laser printers and 3D printers.

03 What facilities are you able to offer (coffee making for example)? Will there be space for users to talk and socialise?

Laser area
6m x 8m

Moulding and casting silkscreen space
5.2m x 2.5m

Shopbot space
6m x 4.5m

Open workspace for project assembly or disassembly
5.2m x 2.5m

Conference / learning space
6m x 6m

Electronics area
5.2m x 4.3m

3D Printing space
3.5m x 5m

Office, materials storage and exhibition space
18m x 4m

Staffing

Finding the right people to staff a FabLab is an important task.

There are different types of staff, hired on different contracts, who can be used to run the lab. The first position to fill is the FabLab manager, and this isn't necessarily the person / people who have initially set up the lab. Try using Maker networks to find candidates who have experience with the equipment and other Makers.

There are many functions that need to be performed including administrative support, maintenance and cleaning. If your FabLab is seeking to be more professional and impactful then you may need to think about staff to cover communications, community-building and business development.

Try to work out what each role entails, and what combination of staff suits your lab.

Manager

With stretched resources, FabLabs can be in danger of giving their managers too much to do. In an ideal situation the manager will focus on managing other staff, liaising with businesses and setting up educational courses.

It is helpful if the founders of the FabLab are able to monitor and support the finances of the FabLab to free up the manager to do their job. (The danger is that the manager ends up spending all his / her time chasing money to keep the FabLab alive rather than running the FabLab).

Intern

Interns are either working for free, or for a small salary, for a fixed period of time (between three months and a year). This is typically to enable them to train to use the equipment and to gain experience with applications of the technology.

A standard arrangement is that the intern works one third of their time helping the FabLab users and organising the lab, one third learning the machines and one third working on their own projects.

Volunteer

Many FabLabs rely on unpaid volunteers to support them. In most cases, these volunteers perform routine tasks like cleaning equipment and do so to contribute to the community.

Their contribution is ad hoc so while their combined contribution may be substantial, the FabLab cannot rely on this form of labour as it is not guaranteed. New FabLabs are unlikely to have a large pool of volunteers helping them.

Launch and marketing

Once your FabLab is ready to open you'll need a plan for how you go about opening.

Is a 'soft' opening a good idea? A soft opening involves opening to a small number of selected people who can use the FabLab, test the equipment and enable staff to become familiar with running the lab. It is a 'trial run' that can last a few days or weeks. Your alternative is a 'big bang' opening in which you are open, ready for full business from day one. Either way you should think about whether you have the resources to hold an opening event in which you celebrate the FabLab opening and invite the media.

There are many ways you can publicise the opening of your FabLab, and there are tools you can use going forward to continue to boost the profile of the FabLab. You should consider traditional media.

Many governments are very interested in digital technologies, particularly in relation to Industrie 4.0 and the 'factory of the future'. Traditional media is latching onto this so may be more interested in your FabLab story. For example, the Manchester FabLab opening featured in Financial Times 22 March 2010.

Also, use social media as much as you can. Twitter, LinkedIn, Facebook, Instagram etc. are all effective ways to increase the buzz around your FabLab. Encourage users to talk about the FabLab and share photos of what they make. You can also leverage your networks, for example, draw on and / or create networks with education establishments, local firms and equipment manufacturers. They may want to support your marketing efforts.

Who is your target market?
Understand this to tailor your launch and marketing and remember it may change over time.

01 Photo by Marvin Meyer on Unsplash.

02 Article from the Financial Times regarding the opening of the Manchester FabLab.

Inter-generational learning

There are many ways that knowledge can be shared between generations in FabLabs. A typical example could be: Mark and Johnny both worked as engineers and are now retired. Evan is an apprentice for a large manufacturing company and he comes to the FabLab to learn about traditional engineering concepts from Mark and Johnny. Mark and Johnny are trying to understand 3D design from Evan!

Children and young adults

Younger FabLab users can gain a lot from FabLabs and contribute to the Fab community in many ways. A typical example could be: Anna started visiting her local FabLab when she was six. She is now extremely proficient with all the equipment. Anna is a regular FabLab user and even holds educational courses for other users.

01 Big FabLab, US.
02 Vigyan Ashram FabLab, India.
03 Series of objects created at the Manchester FabLab, UK.