



# Foreword

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## The fallacy of the open-source movement

In November 2015, I decided to build a low-cost, large-scale farm bot in New Zealand. Producing food for all, automating most tasks - sounds good doesn't it?

But when I looked at the blueprints and code for the open-source farm-bot, I realised I did not have either the knowledge or the tools to make it happen.

I knew of many other people in the same situation, and there were no places in Auckland in which to teach ourselves these skills after working hours.

So I wondered : how do we solve that?

## Stepping in

During my research, I discovered the Fab Lab network. I attended two conferences in 2016 and 2017 and thought, "yep, that sounds like the solution."

I took a year off work in 2017 and began setting up a Fab Lab here in Auckland. I focused on urban farming, low-cost tech, and recycling.

I signed up for the Fab Academy to gain this knowledge, bring it back with me to Auckland and spread it in the most accessible and engaging way possible. That is the purpose of the final project I am proposing here.

I hope you will like it.

Have a good read,

Baptiste



# Proposal : Fab Academy Final Project

# What is the problem?

## Practical Knowledge is Hard to Share

I have visited many hackerspaces / makerspaces recently, and found that the knowledge is there, but held by only a few. These people are usually happy to share it but :

- There are more people willing to study than there are teachers. If they teach in a normal classroom, teachers cannot cater for everyone
- People with the knowledge usually work full-time, and they have limited time in which to share their knowledge. It is difficult for them to adapt their schedules to match the schedule of a large variety of students (i.e. children during the day, adults outside of working hours)
- Teaching takes a lot of patience and understanding of pedagogy to adapt to the learning speed and style of different people.

## AI, Automation and Techy Stuff are Pretty Scary

The mainstream media mostly communicates about the dangers of automation, AI, and overall technology. People rarely hear about projects with positive outcomes for the community.

The knowledge that is required to understand and harness the potential of technology seems to overwhelm those with curious minds. Formal studies require full-time commitment, and are expensive.

Opening the doors of learning spaces that are dedicated to urban farming, green energy, automation for community, and tech for “good”, could spark a shift in the mainstream mindset.

# What is needed? Who needs it?

## Knowledge Holders

People with knowledge want to teach when they are free, without stress, and without dealing with difficult personalities.

Some of them would like something in return, for example collaboration on their projects.

## Learners

New learners want to learn in a way that is fun, rewarding, accessible to their education level, available when they are available, and gives them a sense of progression.

Then, they can become teachers themselves, and share their new skills with others.

# What already exists?

There are many resources for learning how to make things. Below are a few, and the reasons why they do not fully solve the problem.

## Formal Courses

Universities, the Fab Academy and other design courses : they teach these skills and offer access to tools, but they are usually full-time, they are expensive, and they can only welcome a limited number of students at their locations. A great way to up-scale is to use...

## Online Resources

They offer a great way to share knowledge with a large audience, and they are accessible for anyone at any time.

Instructables, How to geek, Wikihow, Wikifab, Hackaday, Arduino project hub : it is free, anyone can share their knowledge, and it is project-based.

But it is “messy”. Newbies wonder :

- What level of knowledge is required for this project?
- How do I find what I am interested in?
- How much have I progressed?
- Where do I get the tools?
- Also, pictures and text only are not very fun, are they?

Youtube, Lynda : Videos are an engaging medium, but they are not organised in a practical manner.

Scopes : it targets teachers teaching students, not directly learners.

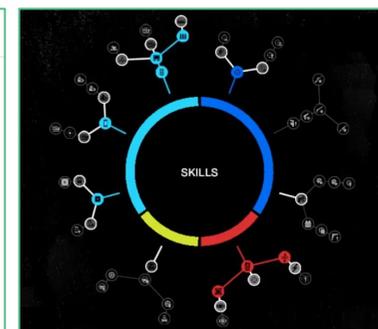
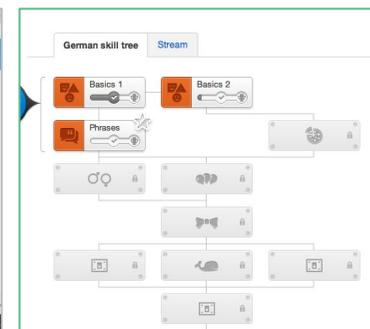
## Inspiration

Duolingo and other RPG games : They both use skill trees, a very appealing visual representation of the growing skillset of a user. Also, Duolingo is now being developed by volunteers, much like Wikipedia.

### Examples of skill trees



Duolingo



Watch Dogs 2

Code Academy: it is a fun way to learn code with an incremental difficulty. They use a freemium system to pay their developers.

**To summarise**, there are great tools online. However learners have to source the physical tools themselves. It would be ideal to provide both, working together.

# Hypothesis Description

## **Making an App for All to Use to Share Knowledge in Digital Fabrication**

The app will be based on the best of what already exists:

- Anyone can share and contribute to the growing knowledge
- It is hands-on and project-based
- It is accessible at all times
- It is taught through an engaging medium : videos or AR
- It is available even when someone has no prior knowledge
- It offers a sense of progression
- It is fun
- It is cheap
- It uses existing online resources

## **Alongside the App, Offering a Set of Tools Needed for Learning**

- Several “learning kits” that learners can pick up when the app tells them to
- These “learning kits” can be upgraded when new lessons are created

## **The Projects Being Built are About Urban Farming, Recycling, and Green Energy.**

- There must be existing Fab Academy projects that could do the job

## **Keeping it Realistic**

I am talking about setting up a minimum viable product and testing it. This would be a starting point upon which to expand afterwards.

It is not just about the app and the tools, it is about building a community - and that is where the minimum viable product can help.

# What have I done so far?

I researched what existed inside and outside of the Fab Lab network. I found that most projects were lacking financial sustainability, and had a hard time reaching a wide community.

To remedy that, I wrote a business plan and got seed funding. With this money, I bought some tools and started making the learning kits.

I set up a registered charity to have a legal status for a social enterprise, to make my intentions clear, and apply for donations. I also received an official affiliation from the Fab Lab network for a future learning space in Auckland.

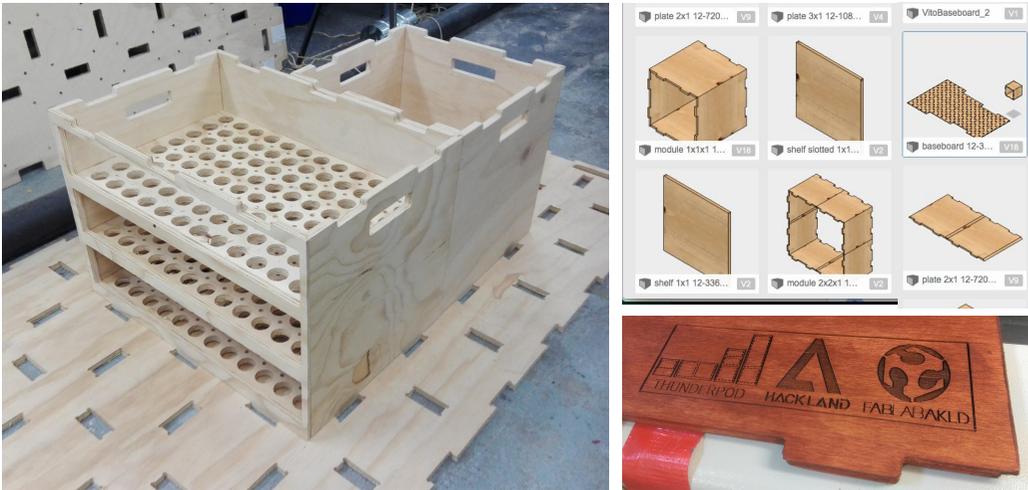
I found a space and a community that are focused on urban farming, recycling, and skill sharing. It is a decentralised organisation, with 2000m<sup>2</sup> of outdoor space, in the middle of Auckland..

I have connected with Fab Labs internationally at the Fab conferences, and locally with makers and local councils, to collaborate with them once the minimum viable product is available.

# What have I done so far?

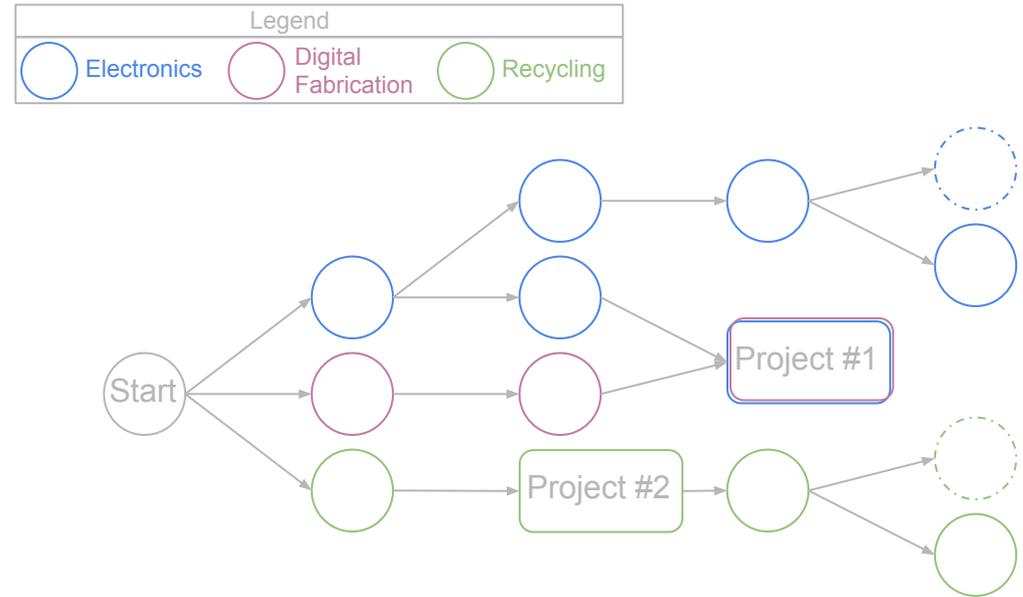
## Design of the Learning Kits

The design of the learning kits is based on an modular, open-source storage system. They are small enough to be transported, making it suitable for a mobile Fab Lab. They use basic materials (12mm plywood) and hardware, widely available internationally, for easy replication.



## Design of the App

The design is based on small learning units (same as duolingo) which branch off into several projects:



# What have I done so far?

## Design of the Space

The goal is to eventually design a learning space that can be easily replicated. This includes a safety system for some tools, so members do not get injured using tools they have not been trained for. This way the learning space is mostly automated for its adult members.

## Answering a Current Demand

Many schools, libraries, and community centres want to get up-to-date with current technology, but they do not know how. This space, its safety system, learning kits, and app, will answer their needs.



- > 1/ A large number of learning kits, aligned against the wall below digital tools. They can be taken outside the lab to be used in public places;
- > 2/ Digital tools, placed behind windows for safety reasons, and accessible with a swipe card that is loaded with the right credentials;
- > 3/ Sliding shelves offering storage for members, displaying the Fab Lab charter;
- > 4/ A welcome counter with leaflets, and a computer to register as a member, or to pay for sessions;
- > 5/ Workspaces;
- > 6/ A recording studio, to record video-tutorials - also can be used as an office space and demonstration space when needed;
- > 7/ A vending machine for electronics and other parts.

# What have I done so far?

## Planning for financial sustainability

To grow, this educational system will need to become financially sustainable, so I drafted a business plan which include a financial forecast. In the business plan I describe how the app can be used for after-school and holidays programs for children, and via membership system for adults

## Seeding a Community Focused on Urban Farming, Recycling and Skill Sharing to Set Up a Proof of Concept

I am involved with a local organisation sharing similar values and offering spaces for free to grow projects that align with these values.

### Fablab Auckland Business Plan

Providing widespread access  
to modern means for invention

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# What will I do during the Fab Academy?

## Developing the Minimum Viable Product Within the Scope of the Fab Academy

### Web Design and Development :

- Finish the development of the App. I will work by iteration to ensure the basic features are functional.

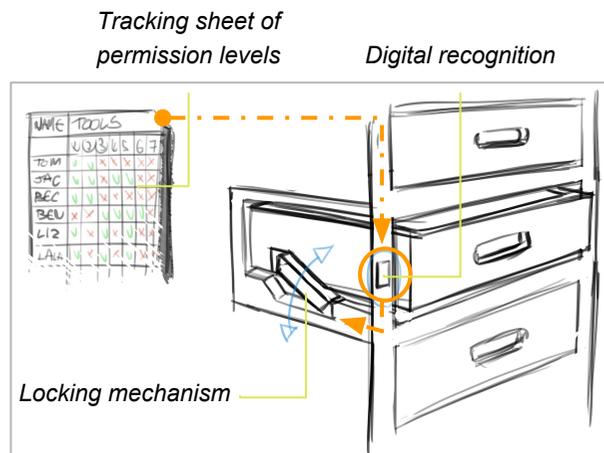
### Digital Fabrication, Electronics Programming and 3D Modelling:

- Select a project about urban farming (Farmbot, Aquaponics etc) and break down the fabrication steps.
- Design and produce a set of video tutorials for each step.
- Finish the design and fabricate the Learning Kits according to what is required for the video tutorials.

## Note About the Fabrication of Learning Kits

The skills learned during the Fab Academy will be utilised in designing Learning Kits for complex projects.

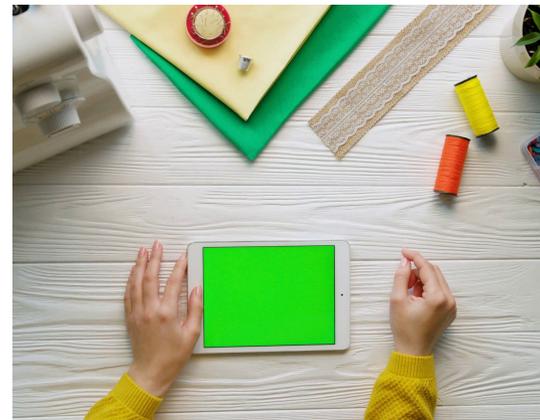
The storage will integrate a locking mechanism ensuring people without required skills cannot access dangerous tools.



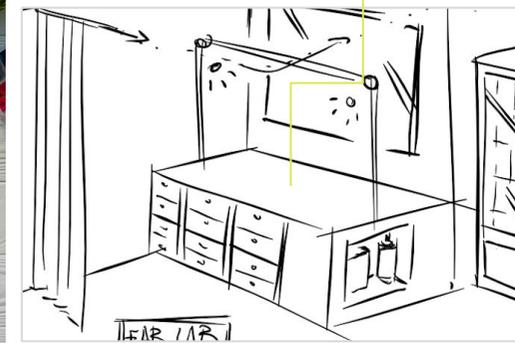
## Note About the Design and Production of Video Tutorials

Breaking down the learning process enables beginners to learn about digital fabrication at their own pace. To ensure learners have all tools required for the tutorial, they will be invited to gather together the Learning Kits at the beginning of each video.

### recording video tutorials



### Lighting and camera rig



# Potential future development

## Running the minimum viable product in Auckland with the Local Community

The product will be tested on-site and around Auckland via the use of a trailer. It important to reach areas that do not have access to this type of knowledge and technology for financial reasons.

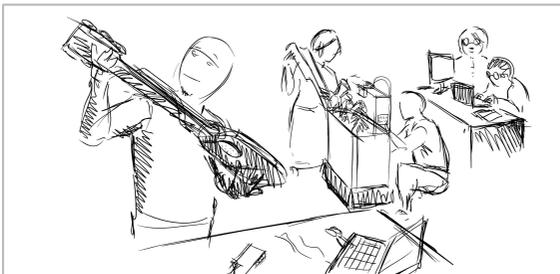
#1 : Activations - small scale activities run in public spaces



#2 : After-school and holiday programs



#3 : Membership and innovative competitions

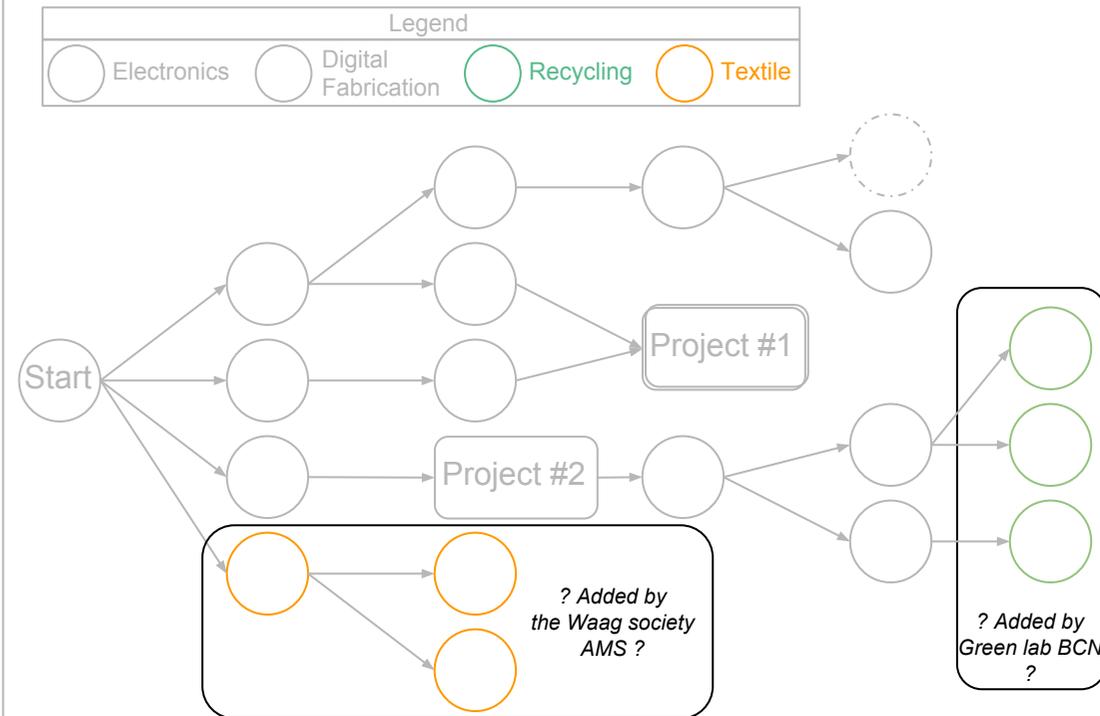


#4 : Project Incubator



## Facilitate the Spread of Knowledge by the Fab Lab Network and Other Makers

The system will be available for others to upload their own videos, add units of learning, and add projects.



Hopefully the system will be successful and other fab labs can use it and participate in its development, transferring knowledge globally for local benefits.

# Potential future development

## Developing an Eco-District

The future of urban areas lies in the hands of the local population.

The introduction to the processes and possibilities behind digital fabrication enables urban communities to enhance their understanding of the impact of mass manufactured products. Consumers can then make educated decisions in their purchasing, supporting locally sourced products, and products with low environmental impact.

With the setup of a proof of concept right in the middle of Auckland, I hope to nurture a more ecological mindset, as well as a creative approach locally, enabling urban communities to source raw materials, design, and manufacture products locally.

New Zealand is a remote place on the globe, and sending physical goods there takes a lot of resources. I hope that this initiative, via the use of digital tools, will connect New Zealand with the Fab Lab networks worldwide.



*Planned facilities to develop / test the project*

“The future is already here –  
it’s just not very evenly distributed”

*William Gibson*

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