MAKE

Open Makerspace Toolkit

How to set up, manage, equip and sustain different types of open, collaborative and innovative makerspaces

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African Higher Institute of Open Science and Hardware Press
Yaoundé, Cameroon

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Introduction

Makerspaces are open, shared and collaborative spaces where people with common interests (in craft, technology, design and product development, etc.) can come together to socialise and work on projects while sharing ideas, equipment and knowledge (Mboa, 2020, p. 1). They can be located in a variety of environments, such as communal, educational (schools, libraries, universities), museum, commercial venues as well as in autonomous non-profit centres (Ahmadi et al., 2019; Irie et al.,, 2019; Geser et al., 2019, 61). Makerspaces are characterised by their ideological foundations (do-it-yourself (DIY), open source, open science, etc.), the values shared by members (openness, sharing, inclusion, accessibility...), the tools found there (3D printer, laser cutter, Arduino, sewing machine...) and practices (ideation, prototyping...). At the heart of this dynamic is the construction, conservation, appropriation, accessibility, distribution and circulation of knowledge, which have been accelerated by the Internet. In this sense, makerspaces can be defined as Digital Innovation Hubs (DIHs) that drive local, digital innovation, learning, skill building and collaboration through digital prototyping, design, fabrication as well as smart manufacturing.

In our project (mAkE) we have chosen to work with makerspaces because of the important and growing role they play in the digital innovation ecosystem, particularly in Africa where manufacturing has been identified as a critical growth area to bring more jobs

to the African economy. Indeed, makerspaces enable communities to actively shape social computing and innovation, especially marginalised groups in the so-called Global South, youth, and women (Blikstein, 2013; Cervantes & Nardi, 2010; Fitton et al., 2015; Fox et al., 2015, Gershenfeld, 2005; Hook et al., 2014; Richard et al., 2015; Tanenbaum et al., 2013). As digital manufacturing technology becomes cheaper and more ubiquitous, they are offering possibilities to quickly switch from concept to prototype, then to unit and/or serial development (Bouvier-Patron, 2015). This opens up commercial opportunities for makers, in particular in countries lacking traditional industrial production facilities. Further, makerspaces provide young people and students in Africa access to digital prototyping and fabrication tools, and thereby the possibility to actively contribute to digital innovation, which they would otherwise not have access to.

The Open Makerspace Toolkit (OMT) provides Key stakeholders (makers, policymakers, funders...) of the maker movement with materials and resources for professional development, outreach, collections, and programs on how to set up, manage, equip and sustain different types of open, collaborative and innovative makerspaces. The Toolkit consists of two main parts: 1) Creating a makerspace; 2) Managing a makerspace in a sustainable and inclusive way.

PART I

CREATING A MAKERSPACE

Creating a Makerspace is a multifaceted endeavour that extends beyond acquiring tools and equipment. It requires a deep understanding and embrace of the maker ideology, fostering a vibrant community where creativity, collaboration, and innovation thrive. Moreover, determining the legal status of Makerspace is crucial, setting the framework for its operation within the jurisdiction's legal system and ensuring adherence to regulations.

This chapter serves as a comprehensive guide to establishing a thriving hub for innovation, covering key steps from conceptualization to realization. Readers will learn how to define a clear vision that guides resource selection and community involvement, spanning from STEM education to entrepreneurial ventures. Understanding the legal framework and implications of various organizational structures, such as nonprofit organizations or for-profit entities, is also essential for ensuring compliance and accountability within the jurisdiction.

Furthermore, the chapter explores practical aspects such as space design, equipment selection, safety protocols, and

accessibility measures. By optimising workflow and collaboration through strategic space layout and choosing high-quality equipment aligned with the audience's needs, Makerspaces can inspire innovation and empower individuals.

Key highlights covered in this section include:

1. **Defining the Vision:** Establish a clear vision that guides resource selection and community involvement, spanning from STEAM education to entrepreneurial ventures.
2. **Determining Legal Status:** Understand the legal framework and implications of various organizational structures, such as nonprofit organizations or for-profit entities, to ensure compliance and accountability within the jurisdiction.
3. **Designing the Space:** Optimize workflow and collaboration by strategically designing the layout of the Makerspace, including distinct zones for various activities and ample storage for projects in progress.
4. **Selecting Equipment and Supplies:** Choose high-quality equipment aligned with the audience's needs to inspire innovation.
5. **Ensuring Safety and Accessibility:** Prioritize safety with clear guidelines, training, and supervision, while ensuring accessibility for individuals of all abilities and backgrounds.
6. **Promoting Community Engagement:** Encourage community involvement from inception by soliciting input from stakeholders and hosting inclusive events to cultivate an empowering environment for exploration and skill-sharing.

CHAPTER 1

Foundations of the maker ideology

THREE PILLARS

Makerspaces base their ideology around three pillars: the hacker ethic, the open culture (in the sense of free software) and Do-it-Yourself (Mboa Nkoudou 2017, 73).

THE HACKER ETHIC

The hacker ethic refers to the valuing of freedom of action, the importance of experimentation and verification, distrust of all forms of authority and a fundamental optimism about human capabilities. Here are the seven commandments of the Hacker ethic according to Spadaro (2014, 52):

- Access to computers must be unlimited and total ;
- Always give priority to the hands-on, and to personally check ;
- All information must be free ;

- Distrust authority, promoting decentralisation ;
- Hackers must be judged by their hacking ;
- It is possible to create art and beauty on a computer ;
- Computers can change your life for the better.

OPEN CULTURE

The open culture of the maker movement borrows from the four essential freedoms that characterise free softwares:

- The freedom to run the program as you wish, for any purpose (freedom 0).
- The freedom to study how the program works, and change it so it does your computing as you wish (freedom 1). Access to the source code is a precondition for this.
- The freedom to redistribute copies so you can help others (freedom 2).
- The freedom to distribute copies of your modified versions to others (freedom 3). By doing this you can give the whole community a chance to benefit from your changes. Access to the source code is a precondition for this.

DO IT YOURSELF

The Do-it-Yourself is all about enthusiasm for self-manufacture, tinkering and crafts. Anderson and Le Séac'h (2012, 27) attribute the following three characteristics to DIY: digital self-manufacturing, online collaboration and the use of online files.

CORE VALUES

From these foundations of the maker movement emerge values of openness, sharing and inclusion.

- **Openness –** makerspaces offer those who use them access to expensive and powerful tools which, under normal circumstances, would be difficult for individuals and especially the community to access.
- **Sharing** – Makerspaces are niches of altruistic values of open and reciprocal sharing of knowledge. This is achieved by sharing space, machines, manufacturing plans, code, etc.
- **Inclusion** – makerspaces are places that are open to everyone, regardless of social status or ability to commit; only the sharing of ideas and knowledge counts.

These core values should be an integral part of the operation of any makerspace that aims to be ethical and responsible. To this end, we strongly recommend adopting one or more of the following manifestos:

- OCSDNet Manifesto,
- GOSH manifesto,
- Unesco recommendations on Open Science.

CHAPTER 2

The Preparatory Phase

Setting up a makerspace requires a preparatory phase consisting of three main steps: map your ecosystem, be aware of the maker ideology and research

STEP 1: MAP YOUR MAKER ECOSYSTEM

Careful planning is one of the most important steps you can take to ensure that your project is a success. The first step is to invest time in research and development by reading and comparing what other people are doing in this area. It would be useful to ask yourself the following questions beforehand (Make App Club Team, 2018)

- Do any other makerspaces exist in your context? If they do, is this something that you can get involved in, or is it far enough away to justify a new space?
- Has a makerspace already been tried in your area? If it failed, what were some of the reasons that this happened? Is this something that can be overcome?

STEP 2: BE AWARE OF THE MAKER IDEOLOGY

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STEP 3: RESEARCH

Research should cover the choice of the space, technologies, types of equipment, sustainability strategy and security.

- Choice of the space: Depending on your planning outcome and preferences (eg. a community space, a university makerspace), choose a space that is accessible and has enough room to accommodate equipment and users. Some inspiration for spaces that can work well are: School/ College Classrooms or Science Labs, Theatres and Arts Centres, Church Halls and Community Centres, Libraries.
- Technology: Make sure the space has reliable internet connectivity, sufficient electrical outlets, and other technologies needed to support makers' projects.
  Equipment and furniture : Most commonly, equipment is

related to digital fabrication, electronic/robotic, textiles, woodworking, metalworking, computers and software, general tools.

- Security : Select relevant safety rules and waste management best practices.

CHAPTER 3

Choice of the legal status

The term "Legal status" refers to the recognized condition or standing of an individual, entity, organization, or concept under the law. It signifies the rights, responsibilities, and obligations that are attributed to a particular entity based on its classification, structure, and relationship with the legal framework of a given jurisdiction. The Legal Status of a Makerspace can then be defined as the recognized condition or standing of a makerspace/fablab under the laws of the jurisdiction which it operates in. This is important because it defines the framework within which makerspaces operate, ensuring order, rights protection, and accountability within a society. Every jurisdiction has its own defined legal statuses under which they operate, so it is important to understand the legalities of any jurisdiction you find your makerspace. Makerspaces can exist as : nonprofit organization, profit organization,

NONPROFIT ORGANIZATION (NPO)

A Makerspace formed for purposes other than making a profit, such as charitable, educational, or religious activities. Nonprofits can have various legal structures, such as corporations, trusts, or

associations. Such Makerspaces may focus on community development, education, and fostering creativity.

ADVANTAGES

- Non profit Makerspaces are eligible for tax-exempt status. Non profits are eligible for federal exemption from payment of corporate income tax. Once exempt from this tax, charitable contributions made to non profit makerspaces are tax-deductible.
- Many foundations and government agencies limit their grants to public charities. This is a huge advantage to non profit makerspaces as they can apply for grants and donations, and may attract members who support the mission. This is a legal way of rasing revenue for the makerspace activities.
- Under some jurisdictions, creditors and courts are limited to the assets of the nonprofit organization (if there is any). The founders, directors, members, and employees are not personally liable for the nonprofit's debts. However, there maybe some exceptions. A person (employees. Founder, board, director, ect) cannot use the non profit to shield illegal or irresponsible acts on their part. Also, directors have a fiduciary responsibility; if they do not perform their responsibilities in the nonprofit's best interests, and the nonprofit is harmed, they can be held liable.

CONSIDERATIONS

- Non profit makerspaces must meet requirements for nonprofit status (as defined by the legalities in the jurisdiction they operate), demonstrate a charitable purpose, and maintain compliance with tax regulations.

It is also important to obtain certification as a non profit organization in some jurisdictions, as part of the compilance procedures.

- Nonprofits sometimes do sell products or services to generate revenue, but often, they rely heavily on fundraising, public and private donations to provide services and resources. Raising funds is an ongoing challenge for non profits, which is especially tough when the economy of the jurisdiction iot operates in is poor. Nonprofits often have a harder marketing battle as they must motivate people to donate or volunteer when they likely get no tangible benefits in return.
- Nonprofits typically must report how they use their funds, mostly to donors and funders.as the government, funders and donors like to see most of their funds go to services and not administrative expenses.

FOR PROFIT ORGANIZATION

A makerspace can be organized as a Limited Liability Company (LLC) or as a Corporation.

LIMITED LIABILITY COMPANY (LLC)

A for-profit makerspace organised as a LLC operates with the intention of making a profit while providing services and resources to its members or community. This provision of servies and resources include but not limited to renting of tools and equipment, spaces and offices, selling tangible and intangible products to the general community, etc. In this context, a for-profit makerspace would offer access to tools, equipment, and resources

to community members and the general public for creative projects while operating as a profit-generating entity.

Key considerations for a for-profit makerspace organized as an LLC include:

- Founders or owners of the LLC have limited liability for the debts and obligations of the makerspace. Their personal assets are generally protected from business-related liabilities.
- A makerspace operating as an LLC allows for a flexible management structure where owners or founders can manage the makerspace themselves or appoint makerspace managers to handle day-to-day operations.
- Profits and losses of the makerspace "pass through" to the owners or founders' individual tax returns. The makerspace itself does not pay any income tax. Instead, founders or owners report their share of the profits on their personal tax returns.
- As a makerspace operating as an LLC, owners or founders can develop an operating agreement. An operating agreement outlines the internal workings of the makerspace, including ownership percentages, management roles, decision-making processes, and more.

CORPORATIONS

A for-profit makerspace organized as a Corporation is a separate legal entity from its owners (shareholders) that is formed to generate profit through the operation of the makerspace. This makerspace business structure operates as a separate and distinct legal entity. It is owned by shareholders and managed by a board of directors who appoint a manager(s) to oversee the makerspace's daily operations.

Key considerations for a for-profit makerspace organized as a Corporation

- Shareholders of the corporation have limited liability for the makerspace's debts and liabilities. Their personal assets are generally shielded from business-related obligations.
- The makerspace is managed by a board of directors elected by shareholders. The board is responsible for major decision-making and oversight.
- Corporations are subject to corporate income tax, and shareholders may also face taxation on dividends received. This double taxation can impact overall profitability.
- Corporations are subject to corporate income tax, and shareholders may also face taxation on dividends received. This double taxation can impact overall profitability.

In both cases (makerspaces as LLCs or as Corporations), a for-profit makerspace would operate with the goal of generating revenue while providing community members and the general public with access to tools, equipment, and a collaborative environment. The choice between an LLC and a Corporation will depend on factors such as liability protection, taxation, management preferences, and potential growth strategies.

NONPROFIT WITH FOR PROFIT ARM

A hybrid model in the context of makerspace business structures refers to a combination of different business or organizational structures to achieve specific goals or address unique circumstances. Hybrid models blend elements of two or more

traditional business structures, allowing makerspaces to leverage the benefits of each while accommodating their specific needs and objectives. Hybrid models can be particularly effective in balancing financial sustainability, community engagement, and mission-driven goals. A nonprofit organization with a for-profit arm is a hybrid structure where a nonprofit entity establishes a separate, for-profit subsidiary or division to generate revenue and support its charitable or social mission. This model allows the nonprofit to diversify its funding sources, increase financial sustainability, and potentially create a more stable base of resources to achieve its goals.

A makerspace could be established as a nonprofit entity to focus on community education and training, workshops, outreach, etc. At the same time, it could create a for-profit arm to offer premium services, access to specialized equipment, or commercial projects. This for profit arm of a makerspace should be separated from the nonprofit arm of the makerspace to prevent the occurence of an identity crisis of the makerspace.

- Nonprofit Organization: The nonprofit organization remains focused on its charitable or social mission. It is dedicated to serving its community members and the general public, promoting social good, and addressing specific needs in the community. The nonprofit arm typically operates with a tax-exempt status, which means it is eligible for certain tax benefits and can receive tax-deductible donations from donors and sponsors.
- For-Profit Arm (Subsidiary or Division): The for-profit arm is a separate legal entity, often established as a subsidiary or division of the nonprofit. It operates with the primary goal of generating profits through commercial activities. These activities can include selling products, offering services to Corporations, institutions and individuals, or engaging in other revenue-generating ventures that align

with the nonprofit's mission.

CONSIDERATIONS

- The Nonprofit status of the makerspace can attract grants and donations, while the for-profit arm generates revenue to support the overall mission.
- The for-profit arm generates revenue through its commercial activities. These profits can be used to support the nonprofit's charitable and social activities, thereby reducing the organization's reliance on traditional fundraising methods.
- Both the nonprofit and the for-profit arm should have a clear alignment in their missions and goals. The for-profit activities should complement and support the nonprofit's social or charitable objectives.
- By diversifying its revenue sources, the nonprofit can achieve greater financial sustainability and reduce its dependence on grants and donations
- The for-profit arm may benefit from the nonprofit's reputation, mission alignment, and established networks. In return, the nonprofit may gain access to expertise, resources, and revenue generated by the for-profit activities.
- The governance and management structures of the nonprofit and the for-profit arm may differ. There should be clear policies and procedures in place to manage potential conflicts of interest and ensure that the for-profit arm's activities do not compromise the nonprofit's tax-exempt status.
- Establishing a for-profit arm requires careful legal and regulatory considerations. Depending on the jurisdiction

and the nature of the activities, there may be tax implications, reporting requirements, and compliance obligations to address.

- Open communication and transparency are essential to ensure that stakeholders understand how the for-profit arm operates, how profits are used, and how it supports the nonprofit's mission.

It's important for makerspaces to take into consideration that while this hybrid model offers potential benefits, it also requires careful planning, legal guidance, and effective management to ensure that the nonprofit's tax-exempt status is maintained and that the for-profit arm's activities align with the nonprofit's mission and values. Consulting with legal, financial, and nonprofit experts is strongly recommended when considering and implementing a nonprofit with a for-profit arm structure. Moreover, the choice of business structure will impact taxation, liability, and operational aspects.

CHAPTER 4

Layout and Equipping

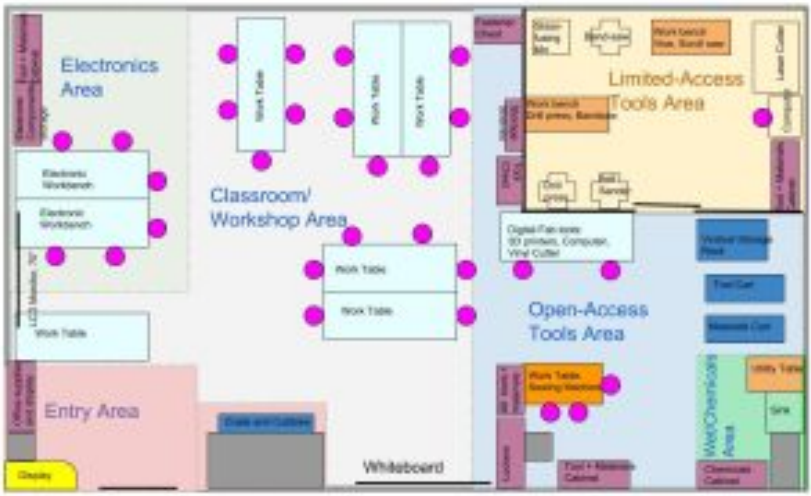
LAYOUT

The spatial organisation of a makerspace is crucial to creating an environment conducive to creativity and learning. The makerspace needs to be adaptable, because the needs of the community can change over time. That is why the space should be zoned: divided into different zones for different types of activity. For example, have one area for electronics, another for woodwork, a collaborative workspace, and a storage area, etc.

Table 1: *Description of the zones and workstations in a Makerspace*

Zones	Description	Workstation
Reception	This area is used to welcome members and visitors, provide information about the makerspace and its rules, and manage registrations and tool loans.	A single workstation could be sufficient to manage registrations, tool loans and information.
Co-working space / training area	This is a multifunctional space that can be used for meetings, training courses, workshops, presentations, group work or simply computer work. It can be equipped with modular tables, chairs, whiteboards, projectors, etc.	The number of workstations can vary greatly, depending on the size of the space. You might consider having enough space to host workshops or group training sessions. For example, a space that can accommodate 10 to 20 people might be a good place to start.
Electronics / robotics area	This area includes soldering workstations, development kits for microcontrollers such as Arduino or Raspberry Pi, electronic components, robots and more.	Depending on the size of the space, you could envisage having 3 to 5 workstations, each equipped with the necessary tools for electronic and robotic work.
Digital fabrication area	This area includes 3D printers, laser cutters, vinyl cutters, thermal presses, etc. Workstations for the preparation and post-processing of 3D prints can also be located here.	The number of workstations depends on the number of machines you have. Each 3D printer, laser cutter or other machine could be considered a workstation. The preparation and post-processing area could also be considered a workstation.
Woodworking area	This area includes woodworking tools such as circular saws, drill presses, planers, etc. It would also include a space for wood storage and finishing work. It would also include space for wood storage and finishing work.	Given the size of the tools and the need for space for woodworking, 3 to 5 workstations could be a good starting point.
Metalworking area	This area includes lathes, drilling machines, welding machines and other metalworking tools. It would also include space for metal storage and finishing work.	As with woodworking, 3 to 5 workstations could be appropriate, depending on the size of the space and the equipment available.
Textile/ sewing area	This area includes sewing machines, embroidery machines, mannequins, a large cutting table and other sewing and textile supplies.	Depending on the space available, you could have 2 to 4 stations, each with a sewing machine, and a cutting and preparation area.
Storage area	This space is used to store materials, tools, ongoing projects, etc.	This area does not generally require dedicated workstations, but must be large enough to store materials and ongoing projects.

Security area	This area would contain safety equipment such as fire extinguishers, first-aid kits, safety glasses, gloves, etc.	This area does not require workstations, but must be easily accessible from any part of the space.
Relaxation area	A space to relax, eat and socialise. This can help encourage collaboration and the exchange of ideas between members.	The space required will depend on the number of members, but a small corner with a table and chairs for 4 to 6 people could be a good place to start.



Picture 02: An example of space design and layout (source : [Maker Resources for K-12 Educators])

EQUIPPING

Most commonly, makerspace tools and materials cover eight areas: digital fabrication, electronic/robotic, textiles, woodworking, metalworking, computers and software, furniture and security, general tools.

Table 2 : *Digital Fabrication Tools*

Equipment	Description
3D Printer	These machines use plastic filaments or other materials to build three-dimensional obje They are used to manufacture a wide variety of objects, from prototypes to functional p
Laser cutter	Laser cutters use a high-powered laser beam to cut or engrave materials. They can be u information panels and more.
Vinyl cutter	These machines cut precise shapes from self-adhesive vinyl, which can then be applied designs.
3D Scanner	3D scanners create digital representations of real objects, using light to capture the sha These digital models can then be modified, duplicated or analysed using other digital to
CNC Machines	CNC machines are used to machine materials by removing superfluous parts to create a cut, hollow out or engrave a wide variety of materials, including wood, metal, plastic and projects, such as furniture making or panel cutting.

Table 3 : *Electronic/robotic tools*

Equipments	Description
IoT kit	These kits generally contain a variety of electronic components and sensors to facilit
Robotic kit	Robotics starter kits, such as those from LEGO Mindstorms, Makeblock or VEX Robot
Wireless modules	WiFi, Bluetooth, ZigBee, LoRa and other modules are essential for IoT and robotics p
Breadboards	These tools are used to create and test prototypes of solderless electronic circuits.
Motors and servos	DC motors, stepper motors, servo motors, etc. are commonly used in robotics proje
Resistors	Resistors are passive components used to resist electrical current in a circuit. They a
Capacitors	Capacitors are energy storage devices. They store electrical energy when a voltage is often used in filtering, control and coupling circuits, etc.
Transistors	Transistors are semiconductor devices that can amplify or switch electronic signals a building blocks of modern electronic circuits.
Diodes	Diodes are electronic components that allow current to flow in one direction only. Th current, protect circuits against overvoltage, etc.
LED	LEDs (light emitting diodes) are semiconductor devices that emit light when an elect used as indicators, in lighting, in digital displays, etc.
Connecting wires	Connection wires are used to make electrical connections between different compon such as male-male, male-female, female-female, etc., depending on the connection r

Table 4: *Textiles tools*

Equipments	Description
Sewing machine	A device used to sew fabrics and other materials together with thread.
Digital embroidery	These machines use design software to create complex embroidery patterns. Th automatically embroider on materials such as fabric.
Heat press machine	These machines use heat and pressure to transfer patterns or images onto mat make personalised t-shirts, caps, bags and more.

Table 5 : *Woodworking tools*

Equipments	Description	Example of a model
Circular saw	Electric tools used to make straight cuts in wood.	DeWalt DWE575SB
Jig saw	Outil électrique utilisé pour couper des courbes dans le bois.	Bosch JS470E
Sanding machine	Used for a smooth wood finish	DeWalt DWE6423K
Planing machine	Used to flatten and reduce the thickness of wood.	DeWalt DW735X
Wood lathe	Used for woodturning work such as bowls, vases, balusters, etc.	JET JWL-1236
Drill press	Used to drill precise holes to defined depths.	WEN 4214
Routing machine	Used for a variety of cutting tasks, including grooves, edges and mouldings.	DeWalt DW618PKB
Set of hand tools	Basic tools used for various woodworking tasks.	hammers, chisels, saws, etc.
Work bench	A stable work surface for a variety of woodworking tasks.	Seville Classics

Table 6 : *Metalworking tools*

Equipments	Description	Example/model
Metal band saw	A metal bandsaw is used to cut different types of metal with precision.	JET JWBS-14DXPRO
Metal lathe	A metal lathe is used to machine the metal precisely.	JET GH-1440-1
Milling machine	A milling machine is used to machine metal parts.	JET JMD-18
Metal belt sander	A metal belt sander is used to polish and finish metal parts.	JET J-41002
Anvil	An anvil is used as a hard surface on which metal can be shaped.	Grizzly G8147
Welding unit	A welding machine is used to join metal parts by fusion.	Hobart 500559 Handler 140
Hydraulic press	A hydraulic press is used to bend or shape the metal.	Sunex 5720
Tapping arm	A tapping arm is used to tap holes in metal.	FlexArm A-32

Table 7 : *Computers and software tools*

Computers allow users to design and simulate projects before they are physically built. CAD (computer-aided design), 3D modelling and graphics editing software are essential for creating and modifying digital models. For the software to work optimally, the computers used in makerspaces need to have certain minimum features. The software most commonly used in makerspaces is summarised in the table below:

Areas	Software	Description
CAD (computer-aided Design) / DAO (dessin assisté par ordinateur)	AutoCAD .	Used to create 2D drawings and 3D models
	Fusion 360	3D design software developed by Autodesk.
	SketchUp	Easy-to-use 3D modelling software.
	SolidWorks	3D design software for professionals.
	TinkerCAD	An excellent online 3D modelling tool for beginners.
Digital fabrication	Cura	3D printing software developed by Ultimaker.
	Repetier-Host	Une solution d'impression 3D complète qui permet de c gérer les tâches d'impression.
	CAMotics	Une simulation pour les machines CNC 3 axes.
	GRBL	Un firmware pour les contrôleurs de machines CNC.
Electronic/robotic	Arduino IDE	A development environment for programming Arduino
	Raspberry Pi OS	An operating system for the Raspberry Pi.
	Fritzing	Electronic circuit design software.
	KiCad	Open-source software for designing electronic schemati circuits.
Design	Adobe Creative Cloud	Software suite including Photoshop, Illustrator, Premier Effects and more.
	GIMP	Free, open-source image-editing software.
	Inkscape	Free software for designing vector graphics
Coding	Visual Studio Code	A code editor developed by Microsoft.
	PyCharm	An integrated development environment for Python
	Node.js	A runtime environment for server-side JavaScript
	Unity	A game engine for the development of 2D and 3D game
Interactive learning	Scratch	A programming platform for children.
	MakeCode	A coding environment for beginners designed by Micros

Furniture and security

- Furniture: Choose furniture that is flexible and adaptable to suit different activities. Adjustable tables and chairs, storage shelves and whiteboards can be useful.

- Security
    - Safety: Put safety measures in place, including fire extinguishers, first aid kits and personal protective equipment. Make sure users are trained in safety.
    - Waste management: Set up waste and recycling bins, and consider waste management strategies for materials used in the makerspace.
    - Storage: Provide storage solutions for tools, materials and ongoing projects. Shelves, lockers and storage bins can help keep the space organised.

Table 8: *General tools*

These are the basic tools for carrying out various projects and tasks in a makerspace. They are versatile and can be used in many different types of projects, from woodwork to metalwork, electronics and more. It is also important to train users in the correct way to use these tools and to stress the importance of following good safety practices.

- Hammers
- Screwdrivers (slotted, Phillips, Torx, etc.)
- Spanners (flat, adjustable, Allen, etc.)
- Pliers (flat, cutting, needle nose, etc.)
- Tape measure
- Rulers and squares
- Cutter and scissors
- Cordless drill and drill bits
- Screws and nuts
- Glue, tape and other adhesives
- Files and rasps
- Clamps
- Workbench
- Work light
- Hand saw
- Spirit level
- Sanding paper and blocks
- Markers and pencils
- Work gloves
- Safety goggles
- First aid kit
- Hot glue gun
- Tool box
- Screw extractor
-

Obtaining all of the equipment that you might need for your makerspace may seem like a daunting task. Here are few tricks that

you can use to keep the costs as low as possible (Make App Club Team, 2018):

Tricks to keep the costs low

- First of all, you should be aware that the making you can do in your space, and therefore skills you can develop, will be determined by the equipment and resources you have available. You can start small with the basics in one particular area, and grow as your demand grows.
- Make use of used/donated items rather than buying things new. Call upon your existing network to see what might be available. You might be surprised by how generous people can be.
- Make use of auction sites like eBay to buy second-hand and to secure the best deal. Online shopping comparison sites can also point you towards some bargains.
- Particularly early on, it makes sense to borrow what you can – especially if the piece of equipment is only going to be used for a small amount of time. It also gives you the option to road test equipment before working out if it is worth purchasing.
- It is also possible to raise money for new equipment through fundraising. This could be an excuse for a group project. For example, young makers could create a Christmas gift that could be sold to raise funds.
- Whenever possible, try to work with free software. This gives people the opportunity to access that software at home and to continue to work on it for free.
- The final way to gain equipment is to bid for it through trusts and charitable institutions.

PART II

MAKING ACTIVITIES

Engaging in making activities within a Makerspace fosters hands-on learning, creativity, and the exploration of diverse crafting techniques. From traditional craftsmanship to modern fabrication methods, these activities offer participants a chance to bring their ideas to life and develop practical skills. Makerspaces presents a diverse range of creative activities, catering to a wide array of interests and skill levels. This section provide a comprehensive overview of the various making activities that can thrive within a Makerspace.

Key highlights covered in this section include:

1. **Traditional Crafts:** Whether it's woodworking, metalworking, textile arts, or paper crafts, makers can immerse themselves in the art of handcrafting unique and tangible objects.
2. **Digital Fabrication:** Digital fabrication technologies enable makers to turn digital designs into physical realities. 3D printing, CNC machining, laser cutting, and prototyping tools empower makers to materialize their

ideas with precision and efficiency.

3. **Artistic Expression:** Makerspaces provide a supportive environment for artistic experimentation and growth. Exploring different techniques, styles, and mediums, it is possible to bring creative visions to life on canvas, paper, or digital screens.
4. **Sustainable Practices:** Upcycling and repurposing workshops offer makers the chance to transform discarded items into functional and aesthetically pleasing objects. Makerspace plays a vital role in reducing waste and promoting environmental stewardship through their creative endeavours.
5. **Entrepreneurial Activities:** Makerspaces provide fertile ground for aspiring entrepreneurs to develop and prototype innovative products, refine business models, and connect with mentors and collaborators.

CHAPTER 5

Coding, Programming & Electronics

Coding and programming stand out as indispensable skills, serving as the backbone for innovation and creative expression.

CODING

Coding is a language for computers, it is a set of phrases and syntaxes and rules put together to give an instruction on how a computer/program operates. Like instructions on how to do quite literally everything! And like the many languages we have here on the planet, there are a myriad of programming languages used for many different purposes (BMCC's OpenLab). Through coding, makers gain the ability to manipulate and control electronic components, paving the way for the creation of interactive and intelligent systems. The integration of coding in makerspaces nurtures a collaborative and interdisciplinary environment. Makers with diverse backgrounds and skill sets can converge to collectively tackle complex challenges by leveraging their coding expertise.

PROGRAMMING

In makerspaces, programming plays a vital role. Visual languages like CSS and HTML are employed for website development (with Javascript offering broader functionality beyond websites). Arduino, primarily using C++, is frequently used for programming in makerspaces, alongside tools such as Processing and p5.js for visual design. Programming is best learned by doing and often requires an application to write or edit code, commonly known as an Integrated Development Environment (IDE). IDEs, like those provided by Processing, p5.js, and Arduino, are tailored for specific languages. Alternatively, general-purpose IDEs such as Atom, Brackets, Sublime, or Visual Studio can be used.

ELECTRONICS

While programming languages provide the instructions, hardware and microcontrollers such as Arduino, Raspberry Pi, and ESP32 bridge the gap between code and the physical world. These tiny computers come equipped with various input and output pins, allowing code to interact with sensors, LEDs, motors, and other controllers. Free and open source software for computer programming can be downloaded, avoiding the cost of expensive software packages. Scratch by MIT is a good program to introduce programming to a novice audience, and is also useful for creating video games. These activities use breadboards and wire that is inserted to the breadboard to make electrical circuits. Microcontrollers such as the Arduino are affordable ways to add programming.

CHAPTER 6

Digital fabrication & Prototyping

Makerspaces help creators to turn their digital ideas into real things. It involves using special machines controlled by computers to make physical objects from digital designs.

DIGITAL FABRICATION

Digital fabrication encompasses a diverse array of technologies, each contributing to the realisation of innovative projects. 3D printing takes centre stage, allowing makers to materialise intricate three-dimensional designs layer by layer. CNC (Computer Numerical Control) machines, including routers and mills, carve precision designs into various materials, offering a versatile approach to subtractive manufacturing. Laser cutting, utilising focused laser beams to precisely cut or engrave materials, adds another dimension to the repertoire of digital fabrication tools. Digital fabrication activities can be broadly classified into additive and subtractive (sometimes referred to as “extractive”) processes based on how material is manipulated to form the desired object.

- Additive Fabrication is the process of creating objects by depositing material layer by layer,

using a digital model as a blueprint (e.g. 3D printing);

- Subtractive (Extractive) Fabrication is the process of creating objects by removing material from a solid block or sheet, using computer-controlled machinery (e.g. laser cutter) .

PROTOTYPING

In makerspaces, Makers can transform their digital designs into physical prototypes, bridging the gap between the virtual and physical worlds. 3D printers, CNC machines, and laser cutters become the artisans' instruments, enabling them to craft intricate structures, prototypes, and artistic creations.

A prototype is the first example of something, such as a machine or other industrial product, from which all later forms are developed. Prototyping is a four-stage process: construction, testing, feedback and revision, testing, feedback and revision. A prototype is developed to be tested in iteration cycles (Rieken et al., 2019, 106).

CHAPTER 7

Handworking

The term “handworking” within makerspaces can be defined by a broad spectrum of activities involving the utilisation of hands and traditional tools for creation.

INTERESTS

The age-old wisdom of woodworking can be explored, clay can be imbued with life through pottery, or intricate tapestries can be woven using yarn. The possibilities are boundless, limited only by one’s imagination and the available tools. In the makerspace, handworking transcends nostalgia, serving as a crucial counterpoint to the digital age. It serves as a reminder of the power of human skill and the joy of mindful creation. A sense of community is fostered as techniques are shared and knowledge is gleaned from others, forming a network of support and inspiration. Most importantly, it allows individuals to tap into the Handworking in Makerspaces embraces traditional craftsmanship, highlighting the hands-on skills that bring physical creations to life. Unlike the digital realm of coding, handworking involves manual craftsmanship, using tools, materials, and skilled techniques to shape and construct tangible objects.

Materials play a crucial role in handworking, with makers selecting and manipulating metal, fabric, and more. The tactile experience of working with these materials adds a unique dimension to the creative process. Makers learn to appreciate the characteristics and possibilities of each material, fostering a deeper connection between the creator and the crafted object.

Collaboration and shared knowledge thrive in the handworking realm of makerspaces. Makers with diverse skills, ranging from woodworking masters to textile experts, converge to share techniques and ideas. Safety practices take precedence in handworking, with makers mastering proper tool usage and safety protocols. This ensures a secure and enjoyable environment for all participants, fostering a culture of responsible making.

ACTIVITIES

Handmaking activities encompass, but are not limited to:

- Textile Arts: Sewing, knitting, crocheting, quilting, embroidery, weaving, macrame, basket weaving, rug making, etc.
- Woodworking: Carving, furniture making, turning, joinery, wood burning, intarsia, etc.
- Metalworking: Jewelry making, blacksmithing, metal sculpting, enameling, etc.
- Paper Crafts: Bookbinding, origami, papercutting, calligraphy, quilling, paper mache, etc.
- Glassblowing: The creation of ornaments, sculptures, vessels, etc.
- Soapmaking: The utilization of natural ingredients for crafting hand-made soaps.

- Candle making: Pouring candles into molds or creating container candles.
- Upcycling and Repurposing: Transforming discarded materials into new and useful objects.
- Jewelry Making: Creating unique pieces using beads, wires, clay, metal, and other materials.
- Decorative Painting: Hand-painting furniture, murals, signs, or canvas art.
- Drawing and Sketching: Creating traditional artwork with pencils, charcoal, pastels, etc.
- Printmaking: Utilizing techniques like silkscreen printing, block printing, or linocut to create prints.

PART III

GOOD PRACTICES

Implementing good practices within Makerspaces is essential for fostering a safe, inclusive, and productive environment where innovation can flourish. Just as creating a Makerspace extends beyond the acquisition of tools and equipment, maintaining its functionality and effectiveness requires adherence to certain principles and practices. This section serves as a guide to ensure that your Makerspace operates efficiently and responsibly, promoting the well-being of its members and the broader community.

Key highlights covered in this section include:

1. **Establishing Clear Policies**: Define and communicate clear policies regarding the use of equipment, space, and resources within the Makerspace. Clearly outline safety protocols, code of conduct, and expectations for community engagement to create a cohesive and respectful environment.
2. **Providing Ongoing Training:** Offer regular training sessions and workshops to ensure that Makerspace members are equipped with the necessary skills and knowledge to safely operate equipment and engage in

various making activities. Training should cover safety procedures, equipment operation, and best practices for collaboration.

3. **Maintaining Equipment and Facilities:** Implement a maintenance schedule to regularly inspect and upkeep equipment and facilities within the Makerspace. Ensure that all tools are in proper working condition, and address any issues promptly to minimize downtime and prevent accidents.
4. **Enforcing Safety Measures:** Enforce strict safety measures to mitigate risks and hazards within the Makerspace. Provide personal protective equipment such as safety glasses, gloves, and respirators, and ensure that members adhere to safety protocols while using tools and engaging in making activities.
5. **Fostering Collaboration and Inclusivity:** Create opportunities for collaboration and skill-sharing among makerspace members from diverse backgrounds and skill levels. Actively engage with the broader community through outreach programs, events, and partnerships. Collaborate with local schools, organizations, and businesses to promote STEM education, entrepreneurship, and community development initiatives.

CHAPTER 8

Critical making

Responsible innovation and making in grassroots practices means that those who tinker with existing technologies and develop new solutions do this critically. Critical Making has six core values:

- **Open:** Critical Making promotes open collaboration, including the sharing of skills and knowledge. It boosts creativity in the ecosystem of makers by making processes and results accessible.
- **Local & connected:** Critical Making is happening locally, working on the ground and adapted to a particular socio-cultural context. Thereby, critical making implies an engagement with local communities as well as global networks – thinking globally and making locally.
- **Social & Diverse:** Critical Making reflects on the social dimensions of making, the living realities of those persons involved and concerned, as well as the ethical implications of their work. Critical Making thereby addresses societal challenges and needs. That's why it is so important to strive for diversity and inclusiveness.
- **Reflexive:** Critical Making re-thinks and re-constructs the dominant mainstream maker culture from a critical

stance, reflecting on underlying power structures and their implications.

- **Impactful:** Critical Making aspires to really make a difference. It seeks to improve life and build a sustainable future.
- **Joyful & meaningful:** Critical Making is still about the joy of and in making, but adds meaning to it. What is made critically is made with a specific purpose of individual or social kind.

Here is guidelines for critical making:

Statements	Recommendations
Make Things That Make Sense: Curating A Curious Mind That Goes Beyond Conventional Thinking	Makerspaces should encourage individuals to cu foster an open mindset. Doing so allows individu something meaningful and effective for their cor saad-chinoy-curating-a-curious-mind-that-goes-b
Integrate Local Knowledge: Advancing Empathy As A Tool For Commitment To Care And Responsible Innovation	Makerspaces should promote "learning by doing reflect on their actions, evaluate their outcomes, reflecting, and learning contributes to continuou georgia-nicolau-advancing-empathy-for-commitr
Share How You Make: Cultivating The Skill Of Documentation & Transferring Of Knowledge	Makerspaces should encourage the disseminatio problem-solving. In aiming to democratise acces others, openly, enhancing the collective intellige
Build for Continuity: Reversing Power Dynamics In Community	Makerspaces should organise a structure that er localities. When offering meaningful roles and re equitable environment fostering authentic partn bahar-kumar-reversing-power-dynamics-in-comr
Include Ecosystem Services: Generating A Cycle of Thinking for Longevity	Makerspaces should promote ideas that allow sh adapt to the different timely situations. To consic aravinth-panch-generating-a-cycle-of-thinking-fo

GET INSPIRED BY

- Manual for Creating an Inclusive Makerspace : Creating an inclusive and welcoming Maker Space – Critical Making
- An Introduction to inclusive making: An Introduction to Inclusive Making – Critical Making

CHAPTER 9

Strengthening the Community

Besides infrastructure, the main element of a makerspace is its community. Indeed, members can be a real asset to the success of your makerspace; that is why it is important to strengthen your community. This can happen at three levels:

- Individual level through e.g. capacity building
- Organisational level through e.g. collaborations and partnerships
- Large Public level through e.g. outreach activities.

LEVEL 1: CAPACITY BUILDING

Thanks to the group dynamics occurring in makerspaces, the capacity building of members is encouraged through collaborative dynamics such as: mutual aid, peer-learning, collaborative work and peer-production. Whether it's the sharing of knowledge, information, equipment or space, or the sense of mutual support that emerges among members, these practices contribute favourably to capacity building of makerspace members on a daily basis. Through these activities, they can acquire highly technical

and general skills. Below is a list of skills and attributes which are of benefit to anyone running a makerspace.

General skills and attributes (Staff)	Tech and Maker Skills (members)
● Drive to help people build skills and confidence ● Engage in own learning and exploration ● Enjoy meeting new people and sharing ideas ● Work with project groups to help them achieve their project visions. ● Help learners to acquire skills with tools, tool safety, and other aspects of hands-on fabrication. ● Track use of consumable materials, re-order as needed. ● Ability to run safety training for all who use the makerspace; monitor that safety is practised at all times. ● Ability to lead workshop session ● Good level of digital awareness	● 2D Design and software knowledge ● 3D Design ● Graphics design ● Web design ● Understanding of programming languages and principles. ● Knowledge of programming languages the ability to code ● Electronics ● Video Editing and software applications ● Sound production ● Good with hands, fault finding, and tackling problems ● Wood working ● Metal Working

LEVEL 2: COLLABORATIONS AND PARTNERSHIPS

One of the best ways to help make your makerspace sustainable is to build your reputation by forging links with your local community, local businesses and other organisations within the STEAM (science, technology, education, arts and mathematics) sector. Indeed, many of the established makerspace were founded with the help and support of national, international and local community partners. Partnerships allow you to explore-in directions in which you don't have current expertise, give you built-in audiences through your partner organisations, and build on alternate strengths. Collaboration can take the form of:

- Technical support for local universities
- Collaboration between the informal sector and makerspaces

- Collaboration with other makerspaces and startups
- Collaboration with informal Sector
- International collaborations

LEVEL 3 : OUTREACH ACTIVITIES

- Workshops: Workshops can be a great way to build up an appetite for digital making within your area and can last as little as one or two hours. They usually focus upon one skill or task that can be completed within the time frame. If you already run a successful makerspace, you might want to start thinking about running a workshop to help get more local people into digital making.

- Conferences: Conferences work well when you have already built up a range of contacts with businesses, digital organisations and community partners within your area. They take place in one to three days and offer an opportunity to showcase the work that you are doing, to learn about the latest developments within the STEAM sector and to network. Organizing or attending a conference can be a significant time commitment, so it is often best to partner up with another organisation to deliver the conference.
- Holiday events: School holidays are an ideal time to engage with children and young adults as you will find that they often have an abundance of time. Activities, events and workshops offer an opportunity to explore new things, learn new skills, and meet new people.

GET INSPIRED BY

Capacity Building

- Guidelines for capacity building https://drive.google.com/file/d/18XpGg07pH2fhqbw6STZTvSaxq9PhH2cv/view?usp=drive_link
- Skills Mutual recognition https://drive.google.com/file/d/1Ag7WbbCefkjtmIp3G6RvPPSpjW601fHs/view?usp=drive_link

Collaborations and partnerships

- Working with Artisans https://www.youtube.com/watch?v=cM01htDD3zU&list=PLYSSl-cmO1bYT-9UDa1T3IR3IfKBfB6vH&index=5)
- Local partnerships https://drive.google.com/file/d/1SpTwHJVVxt8vGrr97oEpvVQVdZbSnqDH/view?usp=drive_link
- Community engagement https://drive.google.com/file/d/1pLrR7jg1BfvuwAU4n1qou-LkjhSTXWTW/view?usp=drive_link
- Knowledge Pills : Building a community from the GIG perspective https://www.youtube.com/watch?v=Ri7-hNjGs3c

Outreach activities

- The GOSH Community Events Framework https://openhardware.science/gosh-community-events-framework/

CHAPTER 10

Safety and Waste management

SAFETY PLAN

Makers display, operate, or use items that may pose a danger to others, that is why their work areas should be ventilated, fire-resistant (if need be), well-lit, and conceived in a fashion that allows them to work safely on projects. Moreover, they have to explain what they will do to keep others safe. To do so, it is advised to create a written Safety Plan, which will make you and members of the makerspace, more confident that you are all aware of the foreseeable risks, consider possible consequences, and have taken all the precautions you could to ensure everyone's safety.

Safety plans typically include a description of the exhibit or demonstration, the names, qualifications and previous experience of people working the exhibit, a description of general safety precautions, and the emergency plan. If the project includes fire, the safety plan should also describe the fuel source, how much is onsite, where and how it is stored, how much is burning and in what amount of time it burns, and if the valve has an electronic propane sniffer.

Here are some other more specific safety guidelines often connected to certain kinds of tools.

- Flying objects. Safety glasses should be worn at all times in the shop, especially while working near hammers and power tools to protect eyes from flying debris.
- The air you breathe. Respirators (masks) should also be worn when sanding with either a power sander or by hand. Any kind of soldering generates fumes from the rosin core of the solder so the area should be ventilated.
- Multiple risks. Electric saws have high-power moving blades that can quickly cause traumatic injuries. However the chance of injury is small when properly maintained and used with care and attention. In addition to safety glasses, respirators (masks) and earplugs should be worn during use of electric saws.
- Fire. Heat guns and handheld torches can generate fires if used without proper attention to the work and surrounding areas.
- Burns. Make sure there's cool running water nearby for burns. Use the lower-heat glue guns when possible.
- Sewing can cause a small prick from a needle, but sewing machines and sergers both have enough power to put a needle through a finger when used carelessly.
- Metalwork areas need welding screens or curtains to prevent eye damage in passersby. Visors should be worn while welding.

Very important too, potential hazards reflect the tools as well as the activities in the work space. For example,

- 3D printing is becoming more and more common in makerspaces. However, the materials that they use and their waste products may result in health hazards. Hot parts or plastic resin can cause burns. The printing process can emit toxic volatile particles that can cause respiratory

irritation. Direct exposure to ultraviolet light can cause damage to your vision.

- Laser cutters are also potentially hazardous machines. They use a strong beam of light to cut, drill or engrave various materials. The laser light must be contained within the cutter to prevent damage to vision. Another hazard is the risk of fire caused by the hot laser beam which can be minimised by proper cleaning and maintaining the machine. The waste material produced during the cutting process needs to be removed by a filtration system meeting the specifications of the manufacturer.

WASTE MANAGEMENT

Tasks	Operations
Apply good hygiene practices	• Clean hands in accordance with the hand-washing procedure • Clean equipment in accordance with the equipment cleaning and disinfection plan • Put equipment away
Apply good security practices	• Adopt the safety rules specific to each piece of equipment • Use personal protective equipment (gloves, goggles, helmets, safety shoes, mask, etc.) • Switch off equipment once the operation is complete • Apply general safety rules (fire extinguisher, smoke extractor, smoke detector, etc.).
Apply good sanitation practices	• Clean the workplace (inside and out) in accordance with the cleaning and disinfection procedure • Store closed waste bins • Wipe and disinfect the workroom floor and walls according to the cleaning and disinfection procedure
Collecting solid waste	• Preparing solid waste collection materials and equipment • Sort solid waste • Recover biodegradable waste where necessary • Place non-biodegradable waste in an appropriate container/ cover/bag depending on its nature.
Collecting liquid waste	• Prepare wastewater collection equipment and materials • Place wastewater in a container • Treat the wastewater.

CHAPTER 11

Documenting

In fablabs, makerspaces and other places where people make things, we call documenting the practice of publishing information so that others can remake an object, avoid mistakes or follow a method. This information can be photographs, texts, files, source code, videos, etc.

It is documentation that makes it possible not just to design something, but to allow variants or “forks” to be created, to link people and communities wishing to progress together. In fact, documentation makes it possible to ‘replay’ a pedagogical form, to re-make a complete object from digital files used by distributed manufacturing machines, and even to avoid making mistakes again when the mistakes are documented. Combined with open licences, documentation is the key to legally enabling the replication and improvement of objects and teaching methods in networks, via information sharing, particularly on the Internet.

DOCUMENTATION PORTALS

Documentation can relate to :

- the manufacture of an object (for example with specialised

portals such as wikifab),

- the sharing of files enabling spare parts to be remanufactured to manufacture an object (for example thingiverse),
- the source code (for example Github).

Get inspired by

- Forge d'adaptations Its purpose is precisely to co-produce documentation for running workshops, based on real-life experience and supplemented by instructions for building open objects. The aim is to train people to use online files and documentation to rebuild shared solutions locally.
- Cultivating the skill of documentation & knowledge transfer by Emilio Velis

PART IV

DIGITAL COMMUNICATION AND OUTREACH ACTIVITIES

In the digital age, effective communication and outreach are essential components of any successful endeavour, including Makerspaces. Digital communication offers a plethora of tools and strategies to connect with diverse audiences, amplify the mission, and foster community engagement. This section provides insights and best practices for leveraging digital communication channels to maximise outreach efforts and cultivate a thriving Makerspace ecosystem.

Key highlights covered in this section include:

1. **Set up Digital Communication Strategies:** Digital communication strategies encompass a wide array of platforms and techniques aimed at reaching and engaging target audiences online. From social media to email marketing, understanding the dynamics of each platform

is key to crafting compelling messages and fostering interaction.

2. **Website Optimization:** A well-designed website serves as a central hub for digital communication efforts, providing visitors with essential information and resources. Optimizing website content for search engines, mobile devices, and user experience is crucial for attracting and retaining visitors.
3. **Content Creation and Distribution:** Compelling content lies at the heart of successful digital communication strategies. From blog posts to videos and infographics, diverse formats offer unique opportunities for engaging audiences and conveying key messages. By prioritizing authenticity, relevance, and quality, organizations can captivate audiences and drive meaningful interactions across digital channels.
4. **Outreach Initiatives:** Outreach initiatives play a vital role in expanding reach and impact. Whether through community events, partnerships, or educational programs, proactive outreach efforts enable organizations to connect with audiences offline and foster deeper engagement.
5. **Educational Programs and Resources:** Developing educational programs and resources enables organizations to empower individuals with valuable knowledge and skills. Whether through online courses, webinars, or downloadable materials, providing accessible learning opportunities fosters engagement and promotes lifelong learning within the community.
6. **Evaluation and Adaptation:** Continuous evaluation and adaptation are essential for optimizing digital communication and outreach efforts over time. By

monitoring key metrics, soliciting feedback, and staying attuned to evolving audience needs, organizations can refine their strategies and maximize impact in an ever-changing digital landscape.

CHAPTER 12

Digital Platforms

Digital communication has significantly evolved with the proliferation of various platforms. Here is an overview of different digital communication platforms, their strengths and weaknesses, as well as case studies illustrating successful communication strategies. Each platform offers unique characteristics and caters to different needs and preferences of the audience. Understanding the specific dynamics, strengths, and weaknesses of each platform can aid in tailoring effective digital communication strategies.

SOCIAL MEDIA

Platforms such as Facebook, Instagram, Twitter, LinkedIn, and TikTok offer vast networks for sharing content, interacting with the audience, and marketing. Their main characteristics include instant communication, strong user interaction, and multimedia content (text, images, videos).

- Strengths include extensive reach, engagement through interactive features (likes, comments, shares), and targeted advertising.
- Weaknesses involve dependence on algorithms for

visibility and the potential for negative feedback.

BLOGS

Platforms like WordPress, Blogger, and Medium allow individuals or organizations to publish articles, insights, and updates. Their main characteristics are long-form content, in-depth analyses or narratives, and opportunities for SEO.

- Strengths include content ownership, SEO benefits, and the opportunity to establish thought leadership in specific areas.
- Weaknesses involve the time-intensive nature of producing high-quality content and dependence on engaging and maintaining a readership.

WEBSITES

Websites act as the official online presence for businesses, individuals, or organizations, housing a variety of content from product information to contact details. Their main characteristics are an official online presence, comprehensive information, and branding.

- Strengths include total control over content and branding, credibility enhancement, and direct monetization opportunities.
- Weaknesses involve the need for ongoing maintenance and updates and the challenge of standing out in SEO competition.

FORUMS

Platforms like Reddit, Quora, and industry-specific forums offer spaces for community discussions, Q&As, and knowledge exchanges. Their main characteristics are community discussions, a Q&A format, and deep dives into specific topics.

- Strengths include rich environments for niche communities to engage and share, direct sources of user feedback and market research, and the opportunity to establish expertise on specific topics.
- Weaknesses involve time investment for active participation and monitoring, and reputation management challenges due to negative discussions or feedback.

COMPARATIVE ANALYSIS

	Social media	Blogs	Forums	Websites
Scope	Potentially vast, global audience.	Scope varies, can be significant with strong content and SEO strategy	Niche, but with dedicated and engaged users	Depends on marketing, SEO, and brand recognition
Engagement	High engagement through likes, comments, and shares.	Engagement through comments and shares; depends on content quality.	Strong engagement, in-depth discussions, and community building.	Variable; can be enhanced with interactive elements
Content type	Short, visual, ephemeral content	Long, detailed, informative content.	Conversational content, question-based or topic-specific	Diverse; can include all types of content
Audience	Broad and diverse, but can be targeted through ads.	Interest-based, often seeking in-depth information or solutions.	Niche, community-oriented, seeking discussions or expertise.	Varied, from first-time visitors to loyal customers.

Each digital communication platform offers unique advantages and challenges. By understanding their characteristics and learning from real-life examples, learners can effectively exploit these platforms to reach and engage their target audience.

CHAPTER 13

Content creation

Creating engaging content and developing a strategic approach to content distribution are crucial aspects of digital marketing and audience engagement. Here's a guide on content types, strategy development, and tips for creating content that resonates with your audience.

CONTENT TYPES

Types	Description	Examples
Text	Fundamental for storytelling and information sharing, essential for SEO	• **Blog Posts**: Provide useful information, tips, or perspectives, optimized for SEO and visually appealing. • **Whitepapers and eBooks**: Offer in-depth knowledge on specific topics, great for demonstrating authority and expertise, and serve as lead magnets.
Images	Convey complex information attractively, easier to share on social media.	• **Infographics**: Simplify complex information visually, easy to share, drive website traffic. • **Photography**: Original, high-quality images enhance content appeal and understanding.
Videos	Highly engaging, favored by social media algorithms	• **Explainer Videos**: Simplify complex concepts or products. • **Webinars and Live Streams**: Offer real-time engagement, making the audience feel closer to your brand or message.
Podcasts	Convenient for audiences preferring to listen. Perfect for in-depth discussions, interviews, or storytelling.	• **Interview Series**: Invites experts to discuss relevant topics, adds value, attracts followers. • **Educational Content**: Similar to blog articles but in audio form, ideal for listeners.

STRATEGIES FOR CREATING RELEVANT CONTENTS

DEFINING GOALS

What is the aim with the content? It could be brand awareness, lead generation, engagement, or sales.

- Goals should be Specific, Measurable, Achievable,

Relevant, and Time-bound (SMART).

- The content strategy should directly support the business's overall objectives, whether increasing brand awareness, boosting sales, or establishing thought leadership.

UNDERSTANDING THE AUDIENCE

It is crucial to know the audience, their interests, and how they consume content. Creating personas can help tailor content to meet their needs and preferences. Content should be adapted to the audience's interests, challenges, and behaviors.

- Conducting audience research through surveys, interviews, and social media listening tools is essential;
- engagement metrics should be analyzed to refine the strategy for producing more of what the audience prefers.

AUTHENTICITY AND QUALITY OF CONTENT

Authenticity resonates with the audience. Sharing real stories, experiences, and viewpoints can create an emotional connection.

- Incorporating narratives into content, providing behind-the-scenes looks at the brand or process, and using visuals like images, videos, and infographics can make content more engaging and understandable.
- Prioritizing quality, ensuring consistency in style, voice, and publishing frequency are key.

ENCOURAGING INTERACTION

Content should conclude with a call to action, prompting questions

or comments.

- Strategic placement of CTAs guides the audience on what to do next, whether subscribing to a newsletter, downloading a guide, or commenting on an article.
- Encouraging user-generated content can significantly increase reach and authenticity.

CONTENT AUDIT

Reviewing current content to understand what works and what does not is critical for identifying gaps and opportunities.

- Analytics tools should be used to track content performance, and feedback should be regularly solicited to ensure content remains relevant and engaging.

DISTRIBUTION

Distribution involves determining where and how to share your content, including selecting the right platforms and considering paid promotion to increase reach. A multichannel approach maximizes reach. Engage with your audience where your content is published by responding to comments, participating in discussions, and gathering feedback.

SEO

SEO entails using keywords, meta-descriptions, and relevant tags to improve search engine visibility. Regular keyword research keeps content aligned with audience searches and trends. Technical SEO ensures your website is optimized for search engines, focusing on fast loading times, mobile-friendliness, and structured data.

SCHEDULING

Publication Scheduling involves planning content production and publication to maintain a consistent schedule, ensuring content is timely and relevant. Tools like Trello, Asana, or Google Calendar can help organize and schedule content effectively. Flexibility is key to adjusting your content calendar based on trending topics, audience reactions, or unforeseen events.

ESSENTIAL DIGITAL COMMUNICATION TOOLS, AI & ANALYTICS

CONTENT CREATION

- Canva : A user-friendly graphic design tool with templates for social media graphics, presentations, posters, documents, and other visual content.
- Adobe Creative Cloud : Offers a suite of software for video editing, graphic design, photography, and web development, including Photoshop, Premiere Pro, and Illustrator.
- Grammarly : An AI-powered writing assistant that helps improve spelling, grammar, punctuation, clarity, engagement, and delivery mistakes in English texts.

CONTENT SCHEDULING

- Hootsuite: Allows you to schedule posts across multiple social media platforms from a single dashboard. It also offers monitoring and analytics features.
- Buffer: A social media management tool for scheduling

posts, analyzing performance, and managing all your social accounts in one place.

- Later : Specifically designed for visual content, Later helps plan and schedule your Instagram, Facebook, Twitter, and Pinterest posts.

ANALYTICS

- Google Analytics: Provides detailed insights into website traffic, user behavior, and conversion metrics, helping businesses understand their audience.
- SEMrush: A comprehensive SEO tool that offers keyword research, site audits, competitor analysis, and more to improve website visibility.
- Social Blade : Offers detailed analytics for YouTube, Twitch, Instagram, and Twitter, providing insights into growth trends, follower counts, and engagement metrics.

AI IN DIGITAL COMMUNICATION

- Chatbots and Virtual Assistants: AI-powered chatbots can handle customer service inquiries, provide personalized recommendations, and improve user engagement.
- Content Personalization : Machine learning algorithms analyze user behavior to deliver personalized content recommendations, enhancing the user experience.
- Predictive Analytics : AI tools predict future trends based on historical data, helping businesses strategize their content and marketing efforts more effectively.

CHAPTER 14

Challenges in Digital Communication

Digital communication, while offering immense opportunities for engagement and connectivity, also presents several challenges. Addressing these challenges is crucial for individuals and organizations alike to maintain effectiveness, credibility, and security in the digital realm. Below are some of the primary challenges, along with strategies for managing them.

DEALING WITH INFORMATION OVERLOAD

The sheer volume of digital content can overwhelm users, making it difficult to discern valuable information from noise. This overload can lead to decision fatigue and reduce the effectiveness of communication efforts. Strategies to address these challenges could include:

- Prioritize Quality Over Quantity: Focus on producing high-quality, relevant content rather than saturating channels with frequent, low-value posts.
- Content Curation: Use tools and strategies to filter and

present content that is most relevant and valuable to your audience.

- Personalization: Employ data analytics and AI to tailor content to the interests and preferences of your audience, making it easier for them to find relevance in the information you share.

MANAGING DIGITAL REPUTATION AND DEALING WITH NEGATIVE FEEDBACK

In the digital world, feedback is immediate and visible to a wide audience. Negative comments or reviews can spread quickly and damage an organization's or individual's reputation. Strategies to address these challenges could include:

- Active Listening: Use social media monitoring tools to keep tabs on what is being said about your brand online.
- Responsive and Transparent Communication: Address negative feedback promptly and transparently. Offer solutions and take responsibility where applicable, demonstrating your commitment to customer satisfaction.
- Encourage Positive Sharing: Build a loyal community that is encouraged to share positive experiences, helping to counterbalance negative feedback.

SECURITY CONCERNS (DATA BREACHES, HACKING)

Digital platforms are prime targets for cyber attacks, including data breaches and hacking. Such security incidents can compromise

user data and trust, leading to significant reputational and financial damage. Strategies to address these challenges could include:

- Implement Robust Security Measures: Use encryption, secure sockets layer (SSL) certificates, and regular security audits to protect your digital assets and user data.
- Educate Your Team: Ensure that everyone involved in your digital communication efforts is aware of best practices for digital security, including password management and recognizing phishing attempts.
- Prepare a Response Plan: Have a clear, comprehensive plan in place for responding to security incidents. This should include steps for addressing the breach, communicating with stakeholders, and restoring security and trust.

CROSS-PLATFORM CONSISTENCY

Maintaining a consistent message and brand voice across multiple digital platforms can be challenging, especially as the features and audience expectations vary from one platform to another. Strategies to address these challenges could include:

- Unified Brand Strategy: Develop a clear brand strategy that includes guidelines for tone, style, and messaging, adaptable to various platforms while maintaining core brand elements.
- Platform-Specific Adaptations: Tailor content and engagement strategies to the unique characteristics and audience of each platform, while keeping the overall message consistent.
- Regular Review and Adaptation: Continuously monitor the

performance and reception of your digital communications across platforms, adjusting strategies as needed to maintain consistency and relevance.

LEGAL AND ETHICAL CONSIDERATIONS IN DIGITAL COMMUNICATION

Digital communication operates within a global context, where laws and regulations regarding privacy, copyright, and content can vary significantly. Ethical considerations, such as respecting user privacy, consent, and the responsible use of data, are also paramount. Navigating these legal landscapes and ethical dilemmas can be challenging, especially when trying to engage audiences across different jurisdictions. Strategies to address these challenges could include:

- Stay Informed on Laws and Regulations: Regularly update your knowledge of relevant laws, such as the General Data Protection Regulation (GDPR) in the EU, the Children's Online Privacy Protection Act (COPPA) in the US, and other local data protection laws. This includes understanding copyright laws related to the use of images, videos, and written content.
- Implement Data Protection Measures: Ensure your digital communication practices comply with privacy laws by securing user data, obtaining necessary consents for data collection and use, and being transparent about your data practices through clr privacy policies.
- Ethical Content Creation and Distribution: Avoid deceptive practices such as clickbait, misrepresentation of information, or the manipulation of digital content in ways that could mislead or harm the audience. Ethical considerations also include respecting the intellectual

property of others by ensuring all content is either original, licensed, or properly attributed.

- Accessibility: Ensure digital content is accessible to all users, including those with disabilities. This not only broadens your audience but also complies with legal requirements in many regions, reinforcing ethical commitments to inclusivity.
- Respond Ethically to Negative Feedback: Handle criticism and negative feedback in a manner that is respectful and constructive, without resorting to censorship or retaliation, which can have legal and reputational repercussions.
- Advertising and Promotions: Adhere to regulations governing advertising, such as disclosing endorsements and partnerships, to maintain transparency and trust with your audience. This includes being clear about sponsored content or when influencers are promoting products on your behalf.

PART V

BUSINESS MODELS FOR BUILDING SUSTAINABLE IMPACT ECONOMIES.

Building sustainable impact economies within makerspaces involves establishing business models aimed at fostering social, environmental, and economic well-being within these creative hubs. These models focus on creating positive impacts while generating revenue and supporting local communities. Choices include offering services, supporting startups, and providing training to empower individuals and businesses within the makerspace ecosystem. This section provides insights into business models for building sustainable impact economies within makerspaces, highlighting their potential impacts, advantages, challenges, and complementary models tailored to the unique context of these creative hubs.

Key highlights covered in this section include:

1. **Product Manufacturing:** Makerspaces engage in product manufacturing, creating items under their own brand or in response to specific market demands. By producing locally, Makerspaces cater to unique needs, reduce transportation emissions, and bolster the local economy.
2. **Manufacturing as a Service:** Offering manufacturing services to external clients enables Makerspaces to leverage their existing assets and expertise. By providing advanced manufacturing technologies on-demand, Makerspaces contribute to local economic development and industry competitiveness.
3. **Repair and Recycling:** Repairing broken items and recycling waste materials are integral aspects of sustainable practices within Makerspaces.
4. **Asset Sharing**: Asset sharing models, including membership and machine access, democratize access to space, tools, and equipment within Makerspaces. By providing affordable access to resources, Makerspaces empower individuals and businesses to innovate, reduce startup costs, and improve product quality.
5. **Expertise Sharing:** Training and consultancy services enable Makerspaces to share knowledge and skills with their community. By offering hands-on training and expert guidance, Makerspaces enhance skill development, support local businesses, and attract investment.

CHAPTER 15

Product life cycle

PRODUCT MANUFACTURING

GENERALITIES

Repeat manufacturing of products that are sold under your own name or brand. Making open source design products versus proprietary ones. Consumer products versus industrial. Producing to order versus to stock. Some potential impacts of the product manufacturing model are:

- Making products that meet a local need or are not readily available
- Designing and making machines at a lower cost than importing them can introduce new capabilities and thus increase local production
- Making any products locally saves on transport and supports the local economy
- By making products close to the end user you may be able to offer customization options

Avantages	Challenges
• If you are good at making products for which there is consistent demand, this can be a fairly stable source of revenue	• Unlike when manufacturing is offered as a service, under this model you carry the financial risk if the products do not sell – so you need to make sure you are making products that the market wants. • Standardised processes and quality control tend to be very important for product manufacturing, and these may not come easily to makerspaces which are typically more used to operating as prototyping and experimentation spaces.

COMPLEMENTARY MODELS

Training: Supporting others to develop knowledge and skills with the focus on education and certification
Consultancy : Using your expertise to solve problems or deliver outcomes for others
Marketplace: Creating a mechanism for many buyers and sellers to find each other

BUSINESS MODEL CANVAS

Key partners	Key activities	Value propositions	Customer relationships	Customer segments
• Those who create, have, or collect waste – including industry, municipalities, informal sector waste collectors • Open source communities dedicated to designing equipment for recycling • Governments & NGOs who want to support recycling and local industry	• Collecting waste • Processing waste (may include disassembly) • Finding markets for recycled materials **Key resources** • Technical expertise • A source of waste material • Equipment for recycling	• Reduce waste disposal costs or improve CSR for industrial waste producers • Offer reclaimed or recycled materials as inputs to other production processes – competing on cost, quality or availability with virgin inputs • Reclaimed or recycled materials as a value-added offering.	• Long term relationships with repeat customers if selling materials to industrial users • Consumer sales may be more transactional **Channels** • Build personal relationships with potential commercial users • Sell through resellers or wholesalers • Marketplaces	• Industrial waste producers who need help to get rid of it • Local industries or artisans who need access to raw materials or reclaimed components • Consumers who attach value to products being made from recycled materials
Cost structure			**Revenue streams**	

• Waste collection • Waste processing (sorting, cleaning, disassembly etc) • Machinery used for waste processing (may include development time) • Inventory storage costs (for waste as well as processed materials) • Costs associated with finding and retaining customers	• Turn waste into items or materials that can be used by others and sell it • Charge those who need to get rid of waste, to turn it into something useful • Use waste or reclaimed materials to create new products and sell those.

MANUFACTURING AS A SERVICE

GENERALITIES

Manufacturing items at the request of others (and at their risk). Performing some manufacturing steps (e.g. laser cutting shapes that are then finished by hand) versus manufacturing complete products. Some potential impacts of the Manufacturing as a Service model are:

- Enabling people who want to have products made to source them locally – creating benefits for the local economy
- Making advanced manufacturing technologies (such as digital fabrication techniques) available as a service in locations where there is a lot of analogue manufacturing can have a big impact on productivity and quality, thus making existing industry more competitive.

Avantages	Challenges
• Can be a good way to earn revenue using assets you already own and people who already work for you	• Most orders are likely to be for small volumes, and you need to ensure you are making enough money to cover the engineering time needed to set up the production run. Charging properly for this can make the order unattractive to customers. • This tends to be quite a price sensitive market so margins may be slim

COMPLEMENTARY MODELS

Product Development: It can be useful to separate design

and engineering out as a separate service
Quality Control: This will be an essential part of manufacturing as a service so you may also be able to offer it separately
Machine Access: Some people have the skills and willingness to make the items themselves

BUSINESS MODEL CANVAS

Key partners	Key activities	Value propositions	Customer relationships	Customer segments
• Suppliers of materials & components • Manufacturers with complementary capabilities to you • Government or NGOs who want to support local industry • Manufacturers Associations or similar	• Connecting with clients • Design for manufacture • Manufacturing **Key resources** • Technical expertise • Machines & equipment for manufacturing	• Flexible, fast production of a wide variety of items • Availability of specific manufacturing technologies not commonly found locally • Faster, more accurate, or more efficient ways to produce things • Ability to produce shapes that cannot otherwise be made	• Long term relationships with repeat customers Occasional transactional one-off clients Trust / reputation important **Channels** • Events aimed at local manufacturers • Direct contact with potential clients (build relationships) • Public open days can raise awareness of what you offer	• Local manufacturers or artisans who lack some technologies • Manufacturers who wish to buy in a component rather than make it • Organisations that provide a product it is not their core business to make • Institutional consumers: healthcare facilities, schools, etc

Cost structure	Revenue streams
• Materials & components (unless customer supplies) • Machine usage and other direct production costs (labour, electricity, etc) • Engineering time – it is essential to price this in, as in most situations it is rare for customers to bring designs that really are manufacturing ready	• Typically a price is charged per unit manufactured • Setup costs or engineering time may be charged as a separate item rather than included as part of the per unit price (this can make it clearer why price will vary according to the number of units produced)

REPAIR

GENERALITIES

Getting broken items back into working order. On-demand repairs versus maintenance contracts. Repairing items using readily available materials versus replacing specialist components only manufactured far away. Some potential impacts of the repair model are:

- Keep items in use that would otherwise go to waste or landfill
- Enable people to keep using items that they perhaps could not afford to replace
- Keeping local industry or businesses functioning and productive – economic impacts in the community
- Reduce energy and material usage due to increasing the life span of items

Avantages	Challenges
• In most places there will be demand for the repair of some type of item, and it can benefit the community a lot to offer it	• A wide range of skills may be needed depending on how different the items brought to you for repair are. • Some spare parts may be difficult to get hold of, and the unpredictability of demand can make keeping stock expensive. • For some items, mass produced new equivalents can be so cheap that the labour intensive approach of repairing old ones is uneconomic.

COMPLEMENTARY MODELS

Training: Supporting others to develop knowledge and skills with the focus on education and certification
Marketplace : Creating a mechanism for many buyers and sellers to find each other
Sale of Materials: Selling materials that others can use to make products

BUSINESS MODEL CANVAS

<table>
<tr><th>Key partners</th><th>Key activities</th><th>Value propositions</th><th>Customer relationships</th><th>Customer segments</th></tr>
<tr><td rowspan="2">• Repair Café movement
• ASK Network (open source repair toolkit)
• Suppliers of components and spare parts
• Look for partners who can help you with any of the items that would otherwise be costs: e.g. community centres or libraries who might let you use their space</td><td>• Advertising
• Repairing
• Ensuring parts availability</td><td rowspan="2">• Ability to use the item or device again (whether for personal use, or in income generating activities)
• Cost savings over buying a new item
• Reduce waste and the number of items going to landfill
• Convenience – being able to get something working quickly</td><td>• Service relationship
• Co-creation – repairing things alongside the customer and transferring skills at the same time</td><td rowspan="2">• People with broken items
• Organisations with broken items
• Organisations who provide items to others that they want kept in good repair
• Charities or other organisations that want to support device repair</td></tr>
<tr><td>Key resources
• Repair skills
• Tools & equipment</td><td>Channels
• Social media & local advertising to individuals
• Word of mouth & referrals
• Build relationships with organisations</td></tr>
<tr><td colspan="3">Cost structure</td><td colspan="2">Revenue streams</td></tr>
</table>

• Time • Components • Tools & equipment • Inventory carrying cost • Space where repairs are carried out • Advertising or marketing costs	• Charge for repairs (by time spent or per item) • Charge for spare parts • Charge an annual fee for maintenance • Ask for voluntary contributions (tips / pay what you can) • Vol

RECYCLING

GENERALITIES

Take a waste material and turn it into something that can be used or turned into new products. For information about creating new products from the processed materials, see "Product Development" and "Product Manufacturing". Some potential impacts of the recycling model are:

- Use of waste that would otherwise cause litter or go to landfill.
- Reduce energy usage, by bringing materials back into use and/or by reducing transport (enabling new products to be made from waste materials collected locally)
- Raising public awareness of recycling and environmental issues; demonstrating that waste can be worth something can change people's behaviour.

Avantages	Challenges
• If you get the model right, there is the potential to earn revenue from waste products while having considerable positive impacts – an attractive proposition.	• There are a number of different steps in the chain which must all be worked on: from developing reliable sources of waste, to technical challenges of small-scale recycling, to marketing and attracting customers to ensure there is a market for what is produced. • Machinery for small-scale recycling is not widely available commercially; there are many open source designs available online but these are often at a relatively low level of design maturity and may not be suitable for commercial use. Be prepared to spend considerable development time on the machinery and processing equipment.

COMPLEMENTARY MODELS

Sale of Materials : Selling materials that others can use to make products
Product Development: Designing and prototyping new or custom products
Product Manufacturing: Manufacturing and selling products, including machines, in your own name

BUSINESS MODEL CANVAS

Key partners	Key activities	Value propositions	Customer relationships	Customer segments
• Those who create, have, or collect waste – including industry, municipalities, informal sector waste collectors • Open source communities dedicated to designing equipment for recycling • Governments & NGOs who want to support recycling and local industry	• Collecting waste • Processing waste (may include disassembly) • Finding markets for recycled materials **Key resources** • Technical expertise • A source of waste material • Equipment for recycling	• Reduce waste disposal costs or improve CSR for industrial waste producers • Offer reclaimed or recycled materials as inputs to other production processes – competing on cost, quality or availability with virgin inputs • Reclaimed or recycled materials as a value-added offering	• Long term relationships with repeat customers if selling materials to industrial users • Consumer sales may be more transactional **Channels** • Build personal relationships with potential commercial users • Sell through resellers or wholesalers • Marketplaces	• Industrial waste producers who need help to get rid of it • Local industries or artisans who need access to raw materials or reclaimed components • Consumers who attach value to products being made from recycled materials
Cost structure			**Revenue streams**	

• Waste collection • Waste processing (sorting, cleaning, disassembly etc) • Machinery used for waste processing (may include development time) • Inventory storage costs (for waste as well as processed materials) • Costs associated with finding and retaining customers	• Turn waste into items or materials that can be used by others and sell it • Charge those who need to get rid of waste, to turn it into something useful • Use waste or reclaimed materials to create new products and sell those.

QUALITY CONTROL

GENERALITIES

Earning fees for checking the quality of products made by others, to ensure they meet customer requirements or independent standards. Some potential impacts of the quality control model are:

- Improving local access to good quality products, components, and spare parts
- Increasing local production due to increased trust in the quality

Avantages	Challenges
• This could be a good way to earn some revenue at the same time as increasing livelihoods opportunities in the community	• Will likely require high levels of technical skill as well as process control and attention to detail • Contracting may be complex and liability in the event of inadequate product quality may prove to be an issue

COMPLEMENTARY MODELS

Machine Access : Providing access to machines, tools, or other equipment for individuals or businesses to use
Marketplace: Creating a mechanism for many buyers and sellers to find each other
Sale of Materials : Selling materials that others can use to make products

BUSINESS MODEL CANVAS

Key partners	Key activities	Value propositions	Customer relationships	Customer segments
• National standards bodies • Universities or test labs with specialised equipment	• Quality control: checking what standards products should meet and verifying they meet them • Contract & risk management	• Higher quality products • Risk reduction to buyers and sellers as a result of improved product compliance	• Trust-based – built on reputation and/ or repeated interaction	• Organisations who want to buy locally made products • Manufacturing organisations who want to ensure the quality of inputs they buy • NGOs running livelihoods programs
	Key resources		**Channels**	
	• Manufacturing Engineering expertise • Appropriate test equipment		• Likely through partner channels	

Cost structure	Revenue streams
• Time spent on quality control and managing contracts • Equipment and consumables used in testing • Transport time & costs	• Percentage of sale price of items • Certification charges

PRODUCT DEVELOPMENT

GENERALITIES

Designing products, including prototyping and test manufacture or making one-off products. Designing and making one-off/custom products, versus developing a product that is to be made repeatedly. Consumer products versus industrial products such as designing a machine. Some potential impacts of the product development model are:

- Solving problems that need a bespoke solution
- Designing products to be manufactured locally will have long term economic benefits
- Promoting local culture and industry by making all kinds of one-off items like film sets, parade floats
- Supporting local employment including skilled trades

Avantages	Challenges
• This work is often well suited to those who enjoy makerspaces – it is creative, involves prototyping and technical problem solving	• Demand can be unpredictable, making it difficult to build a sustainable business around it. • May require a large range of skills & expertise (which is why it can usefully be combined with something like XXX, allowing you to draw on skills available in your community) • Project management and business skills are needed to ensure products can be delivered on time, to budget, and with a profit being made.

COMPLEMENTARY MODELS

Consultancy: You may also be able to advise others on their product development processes
Membership: Giving others access to space and equipment to design and make their own things
Marketplace: Enabling you to draw on a pool of skilled people for different jobs

BUSINESS MODEL CANVAS

Key partners	Key activities	Value propositions	Customer relationships	Customer segments
• Suppliers of materials & components • Open source hardware & software communities • Local events, forums, and industry associations • Other organisations doing product development – you may join forces or sub-contract each other	• Product design • Prototyping • Design for manufacture • Advertising / Sales **Key resources** • Creativity • Technical expertise • Machines & equipment for prototyping or manufacture	• Creative or unique solutions • Convenience of being able to bring multiple skill sets together to create an output • Delivery speed may often be a concern • You may be able to develop expertise in a particular area e.g. in making a certain type of machinery	• Long term relationships which likely involve a degree of co-creation **Channels** • Build relationships with those in the communities you are targeting • Publicise examples and case studies of your previous work	• People who want help to design a product for large scale production • Those who want one-off creations such as film sets, parade floats, or artworks • Organizations that have a particular problem that needs a bespoke solution

Cost structure	Revenue streams
• Time • Materials & components • Machine usage • Space where work is done	• Fixed fee for a project (or for the product you make) • Time & materials fees (charging for the time you spend and other costs incurred) • Revenue sharing agreements for products that are to be manufactured in bulk

SALE OF MATERIALS

GENERALITIES

Selling components or materials that others can use to make products or learn skills. Selling individual items versus selling kits; buying the materials for sale versus being a collection & distribution hub for reclaimed or donated items. Some potential impacts of the sale of materials model are:

- Providing access to materials can be an enabler for other impacts you wish to have such as improving skills, enabling businesses, improving quality of locally made items
- Becoming a hub for material re-use and recycling can have significant environmental benefits as well as helping those who need them to access materials at low cost

Avantages	Challenges
• If the technologies you have in your makerspace are not widely available in the community, the materials to use with them also may not be. You can help people to gain access to materials they need and earn some revenue from it.	• It can be difficult to set up supply chains for items not readily available – you may need to buy in bulk, which requires more working capital • Import & currency issues – where you are buying the materials from outside the country, you may need to deal with import procedures, manage lead time uncertainty, or take risk on currency movements.

COMPLEMENTARY MODELS

Machine Access: Making materials available for use with your machines

Marketplace: Selling materials for use in products sold through the marketplace
Events & Edutainment: Making and selling kits so people can do fun activities at home
Repair: Spare parts can be sold for use alongside repair services

BUSINESS MODEL CANVAS

Key partners	Key activities	Value propositions	Customer relationships	Customer segments
• Manufacturers & suppliers of materials • Organisations with waste materials to donate • Others who buy similar materials in significant quantities – there may be an opportunity to lower costs by forming 'buyers clubs' with them	• Procurement • Inventory management • Advertising / Sales	• Availability – giving people access to items they cannot easily get elsewhere • Convenience – materials available where the machines are • Price – recycled materials or direct imports may be cheaper than competition	• Long term relationships with repeat customers who may be members of your community • Reciprocal relations with marketplace partners	• Individuals and freelancers who need things for projects or learning • Businesses who need the items for their operations • Possibility to sell wholesale to other makerspaces or businesses that will sell them on to their customers
	Key resources		**Channels**	
	• Cash flow to pay for the materials before you • Secure storage space		• Sell to people already using your space or your machines (cross-selling) • Online sales (or reservations for collection) may be useful	
Cost structure			**Revenue streams**	

• Material purchase cost • Inward shipping & import duties • Delivery cost if not collected • Inventory carrying costs such as storage space, cost of capital, insurance, administration time [these also apply in the case of donated items]	• The most common is to charge for the materials or components • Revenue sharing may be possible with people who use the materials to make things to sell • Being a collection & distribution hub for recycled materials can enable you to charge for materials that are given for free • In some cases you may provide materials as part of a package that is paid for as a whole, such as training or machine access

CHAPTER 16

Asset sharing

MEMBERSHIP

GENERALITIES

Regular users pay for access to your space and a package of access to assets and services. Limited access or a variety of different levels of access for different membership packages versus unlimited access to all resources. Some potential impacts of the membership model are:

- Making space, tools, machines, and skills to people in your community for them to be able to solve problems and generate positive impacts
- Creation and growth of a community of people and organisations with shared interests – this can give rise to all kinds of benefits including generating new ideas or organisations.

Avantages	Challenges
• This gives a regular and fairly predictable income stream and enables people to access the resources you provide in a manner that suits them	• In some places, the people you most want to work with may not be able to afford membership • Balancing the demands of different members can be difficult without proper policies • It can be difficult to find the right price points and access levels. Some people will use the services or assets more than others.

COMPLEMENTARY MODELS

Training : Supporting others to develop knowledge and skills with the focus on education and certification
Space Rental : Renting out space for long term use
Machine Access: Providing access to machines, tools, or other equipment for individuals or businesses to use
Sale of Materials: Selling materials that others can use to make products

BUSINESS MODEL CANVAS

Key partners	Key activities	Value propositions	Customer relationships	Customer segments
• Sources of new members like education institutes or craft associations • Machine Manufacturers / Resellers • Businesses or NGOs that target your members • Government or NGOs who want to support local industry	• Attracting customers • Balancing price, access and usage levels • Community management • Providing services **Key resources** • Space • Community • Machines, tools, or equipment • Skills in using machines	• Access to a community • Ability to test new ideas, products, or processes • Access to machines and tools • Opportunity to work on personal projects and develop new skills	• Long term relationships with community members **Channels** • Cross-selling from training • Co-location: installing services/ machines next to businesses who will use them • Referrals – word of mouth	• People who want to learn including schools • Startup businesses who want to prototype and experiment • Established businesses who use machines in their work (or could do) • Entrepreneurs who can use the machines to make money or need certain services on a regular basis
Cost structure		**Revenue streams**		

• Cost of staff • Rent or cost of facility • Cost of machines & equipment, including maintenance • Cost of providing any services included in membership packages • Advertising and marketing costs	• Membership fees per time period e.g. monthly subscription. There may be different levels of membership for different charges, offering different access (e.g. full time versus part time, or off-peak times only) • Some spaces charge a one-off joining fee in addition • Add-on charges for things not included in membership package such as extra machine hours

MACHINE ACCESS

GENERALITIES

Providing access to machines, tools, or other equipment for people and businesses to use. Offering a space where people can come and use equipment, versus allowing people to take it away (tool hire – more practical for smaller items). Some potential impacts of the machine access model are:

- Improving skills – enabling people to learn how to use equipment
- Enabling start-ups – they can test the market for product ideas without having to buy all the equipment first
- Reducing costs for existing businesses – they can access different machines without having to buy them
- Improving quality of locally made products – by providing access to better quality or higher precision tools

Avantages	Challenges
• If you have machines and other equipment it can make sense to maximise use of these assets	• High Startup Costs – buying the equipment is expensive. Some options are to seek donors or sponsorship; partner with equipment manufacturers, share machines with others or build your own machines. • Maintenance – Find local maintenance expertise or learn how to do it yourself; consider keeping stock of critical spare parts • Health & Safety – This is very important, you should consider training, monitoring, risk assessment, and accident planning

COMPLEMENTARY MODELS

Training: Supporting others to develop knowledge and skills with the focus on education and certification
Membership: Creating shared access to a community and/or other assets (space and equipment)
Sale of Materials: Selling materials that others can use to make products

BUSINESS MODEL CANVAS

Key partners	Key activities	Value propositions	Customer relationships	Customer segments
• Machine Manufacturers / Resellers • Materials Suppliers • Government or NGOs who want to support local industry • Businesses who use these types of machine	• Attracting customers • Machine Maintenance • Managing Access **Key resources** • The machines / tools / equipment • An accessible location with power	• Ability to learn skills • Offering the capability of the machines at a lower cost or lower hassle than buying them • Ability to test new ideas, products, or processes • Improved efficiency of production processes	• Long term relationships with community members • Partnerships with those who use your machines in their production process **Channels** • Cross-selling from training • Co-location: put machines next to businesses who will use them • Referrals – word of mouth can be powerful among artisan communities	• People who want to learn • Startup businesses who want to prototype and experiment • Established businesses who use machines in their work (or could do) • Entrepreneurs who can use the machines to make money e.g. offer training courses
Cost structure			**Revenue streams**	

• Machine purchase cost • Maintenance costs • Location & power • Advertising • Oversight personnel • Materials & consumables	• Hourly charge for machine use • Membership-type access fees including a certain amount of machine time • Revenue sharing agreements with people who use the machines to offer paid classes or make products for sale • Cross-selling opportunities to sell training, materials, or other services

SPACE HIRE

GENERALITIES

Hiring out use of your space (or part of it) to others for events. Offering space hire only, or with additional equipment and/or services. Some potential impacts of the space hire model are:

- This model is primarily used to earn revenue to support other activities, although there can be beneficial impact from enabling types of event that would otherwise not take place.
- Hosting events at your space may bring awareness of what your space offers to a wider range of people

Avantages	Challenges
• This is a relatively easy way to earn additional revenue from a space that you use most of the time. Finding paying customers is usually the most difficult part for space hire	• In many places this could be an infrequent or unreliable revenue source. Try to identify customers who might use the space on a regular basis and build relationships with them. Think creatively about what organizations may like to be associated with an innovative brand such as yours.

COMPLEMENTARY MODELS

Consultancy: Using your expertise to solve problems or deliver outcomes for others
Machine Access: Providing access to machines, tools, or other equipment for individuals or businesses to use
Membership: Creating shared access to a community and/or other assets (space and equipment)

BUSINESS MODEL CANVAS

Key partners	Key activities	Value propositions	Customer relationships	Customer seg
• Space rental agencies or event management companies • Local companies providing complementary services e.g. catering • Entrepreneurs and local businesses who want to share risk and share revenue for events they organise	• Advertising • Managing bookings • Any additional services e.g. event management **Key resources** • Space • Furniture, audio-visual equipment etc	• Location and/ or characteristics of the space (e.g. classroom for x people) • Brand association with yours • Convenience & package of services (e.g. if audio-visual equipment or catering can be booked along with venue) • Risk-sharing	• Long term relationships with repeat customers • Personal service to help them manage the event • May involve self-service elements e.g. setting up **Channels** • Build relationships with organisations • Local advertising • Via partnerships	• Organ who w host e or trai • Entrep who w use th space gener revenu • Individ familie need a bigger than t home
Cost structure		**Revenue streams**		

• Space • Setup and/or cleaning • Time to manage bookings and provide any additional services • Equipment or materials	• Charge per hour / day for use of the space • Charge for additional equipment (chairs, projector, etc) o services (event management, catering) • Revenue sharing if renting the space out for business purposes – e.g. for someone to run a training course the could charge according to how many people sign up for course

SPACE RENTAL

GENERALITIES

Renting out or subletting part of a larger unit to tenants, whether they are independent or part of your community. Offering seats in a communal space (co-working) versus renting out rooms/ workshops for exclusive use. Some potential impacts of the space rental model are:

- Offering flexible terms to rent space can be a huge enabler for entrepreneurs and small businesses, who may not be able to pay large deposits or take on long term rentals but need somewhere to work
- In many places it is particularly difficult to find small units for light industrial use, making it hard for manufacturing companies to start – this can help them to do that
- Enabling small businesses to co-locate with an equipped makerspace can make it feasible for more experimentation without them having to invest in buying all the machines themselves

Avantages	Challenges
• This can be an excellent way to offset part of the rent cost or to earn revenue. It can also be a way to build community or ensure you have access to certain skills, e.g. offering reduced rent to someone who can maintain machines in your makerspace or contribute to the community in other ways.	• Assuming the whole unit is rented, the makerspace still has the liability for the full rent, so there are risks to relying on others to help pay it – if there is not enough demand for the sublets, or if tenants are short of cash (as startup companies often are).

COMPLEMENTARY MODELS

Events & Edutainment: Organising events and fun activities where the focus is on the experience, and learning happens along the way
Startup Support: Supporting new business creation and growth via a combined package
Membership: Creating shared access to a community and/or other assets (space and equipment)

BUSINESS MODEL CANVAS

Key partners	Key activities	Value propositions	Customer relationships	Customer segments
• Organizations that want to target the kind of tenants you have • Tenants that provide a service to other tenants e.g. a café • Organizations willing to become long term "anchor" tenants	• Attracting tenants • Space maintenance • Managing tenancies & any additional services **Key resources** • Space • Any furniture, fixtures or fittings provided	• Flexible rental of small areas suitable for industrial/ creative use • Being onsite with access to facilities e.g. makerspace machines or workshop space • Co-location with/ access to your makerspace community • Association with your brand – innovative & creative	• Long term relationships • Customers may graduate through different offerings e.g. co-working space to small unit to larger unit as they grow **Channels** • Build startup pipeline through events and support packages • Advertising and open days can raise awareness of what space has to offer	• Individuals and freelancers who want somewhere to work • Startup companies often particularly value flexibility to allow for growth uncertainty • Existing small orgs who want access to makerspace assets • Local branches of larger organizations (companies or NGOs)
Cost structure			**Revenue streams**	

• Space • Maintenance & cleaning • Time to manage tenancies and provide any additional services	• Co-working space fees • Rental charge for exclusive units • Add on services e.g. receptionist, registered office address • Access to workshops / makerspace / meeting rooms at additional cost • Revenue sharing arrangements with growing businesses

MARKET PLACE

GENERALITIES

Creating a place where buyers and sellers can meet and find what they are looking for. Online versus physical. Enabling the sale of physical products versus services or skills. Bringing buyers and sellers together so they can contract with each other, versus taking a contractual role. Some potential impacts of the marketplace model are:

- Supporting livelihoods, whether that is by selling items made by artisans or making it easier to find people with certain skills
- Keeping traditional skills and crafts alive
- Making it easier for businesses to access the skills they need
- Acting as an intermediary can enable sole traders, new startups, or the informal sector to get more business, because procurement regulations often prohibit large buyers (businesses, government, and NGOs) from buying from those who are unregistered or do not have a bank account.

Avantages	Challenges
• Many makerspaces naturally act as a hub, with community members who make many different things or have a range of skills, so this model can work well if the hub gets good at attracting buyers.	• A marketplace model exhibits 'network effects' – it won't usually work with just a few buyers and a few sellers, you have to have a reasonable number of both before it will be successful. You need to think about your value propositions to both sides. • Think carefully about how to manage quality, as poor quality items or services will reflect badly on the marketplace. If you are acting as an intermediary to contracts between others, be careful with liability issues. If a product fails or service is performed badly, who is liable?

COMPLEMENTARY MODELS

Training : If you offer training it can be good to help those trained to find work

Business Services / Consultancy : You may be able to extend the range of services or topics offered by drawing on a pool of experts in a marketplace

BUSINESS MODEL CANVAS

Key partners	Key activities	Value propositions	Customer relationships	Customer segments
• Anyone who already has the attention of the buyers and sellers you wish to attract, e.g. a shopping mall where you could have a market, or an artisans' association • Local government or municipality that wants to support commerce • Orgs that want to target or support businesses you work with	• Attracting buyers • Ensuring an adequate range of goods/ services/ skills is available • Matching buyers & sellers **Key resources** • Pool of willing buyers and sellers • A location or mechanism that enables them to trade with each other	• Allow buyers to go to one place (physical or virtual) to access a range of products or skills to meet their needs • Enable sellers to access buyers they would otherwise have difficulty reaching, or make the transactions easier in some way.	• Depending on the type of marketplace you may be facilitating different types of customer relationships including personal service, co-creation, and self-service **Channels** • Social media & local advertising • Build relationships with sellers & repeat buyers • Referrals and word of mouth	• You may have almost any kind of customer segments for a marketplace, what is important is the match between what the buyers want and what the sellers are offering.
Cost structure			**Revenue streams**	

• Space (for a physical market) or website & internet costs (for an online one) • Advertising, marketing, and vetting costs • Costs of subcontractors if you are managing the work • Cost of any contract management activities you are performing such as project management or quality control	• Charge a commission on completed deals • Sell the products/services to the buyer, and subcontract • Charge for access to the marketplace (e.g. a monthly fee to sellers that enables them to sell as much as they want, or a charging rent for a stall in a physical market) • Charge for listing or advertising a particular want or need

CHAPTER 17

Expertise Sharing

TRAINING

GENERALITIES

Sharing knowledge and supporting others to develop skills, ranging from hands-on machine usage to soft skills like CV writing. Offering training in-person versus online; offering use of equipment as well as training (whether just for class time or also for practice time). Some potential impacts of the training model are:

- Improving skills – enabling people to learn how to use equipment or do things can enhance their opportunities
- Supporting businesses – making it easier for companies to access the skills they need to be competitive
- Making a location more attractive to investment – ensuring a supply of skilled workers can make it easier for organisations to work there
- Improving quality of locally made products (because the people making them are more skilled).

Avantages	Challenges
• The potential customer base is broad, including government, NGOs, and businesses as well as individuals; and it is common to find donors (or less commonly, government entities) who will contribute to training costs for those who can't afford it.	• Developing good training material can be difficult – but for many topics there are lots of examples or open materials online • Not everyone who possesses certain knowledge or skills is good at sharing it with others – teaching is a skillset in its own right • For donors to pay for training, you may need to also be good at grant writing and collecting impact metrics

COMPLEMENTARY MODELS

Space Hire: Hiring out space for short term use
Machine Access: Providing access to machines, tools, or other equipment for individuals or businesses to use
Membership: Creating shared access to a community and/or other assets (space and equipment)
Marketplace: Creating a mechanism for many buyers and sellers to find each other

BUSINESS MODEL CANVAS

Key partners	Key activities	Value propositions	Customer relationships	Customer segments
• Government e.g. Dept. of skills & industry; local government • Companies in industries that need more skilled workers • Recognised training or certification bodies • TVET institutes • Open knowledge orgs	• Connecting with those who need & can pay for training • Developing content • Delivering training **Key resources** • Expertise & course content • Training location and any equipment or materials needed for the classes	• Learn new skills or improve existing ones • Prove skills levels (certification) • [To companies] More skilled workforce • [To governments / donors] – improve skills of population / support particular industries	• Personal service (deliver training) • Co-creation (skills development) • Self-service (online on-demand) **Channels** • Social media & local advertising to individuals • Build relationships with organisations • Online content delivery: webinars, Youtube	• Individuals who want to learn or to prove what they know • Organisations who want to hire more skilled workers • Organisations who want their workers to learn new skills • Government or donor organisations who may pay for skills development
Cost structure			**Revenue streams**	

• Time to deliver training • Time to develop content, market the course • Space [if delivered in person] • Equipment or materials • Donor funding costs	• Charge those who attend a training course • Charge companies to train their workers • Charge for certificates • Have course paid for by govt or donors who want to improve skills • Blended models where individuals pay part of the cost and companies / govt / donors pay the rest • Success fees for job placements

STARTUP SUPPORT

GENERALITIES

Supporting new business creation and growth via a combined package. Massive difference in risk profile of models where you are paid to deliver support versus models where you are betting on the success of the startups. Some potential impacts of the startup support model are:

- Giving startups access to shared resources that lower their costs, alongside expert guidance and tailored support can greatly increase their chances of success
- Job creation, local production, and economic diversification can contribute to reducing brain drain and making communities more sustainable
- Creation of innovative solutions to local challenges

Avantages	Challenges
• Supporting startups around the creation of new products is a core objective for many makerspaces	• For this model to work it is necessary to build a pipeline of the right kind of startups that you can help, and of the mentors, industry experts, and investors who they will need to connect to. • Fewer investors are interested in hardware startups and in environments where there is a severe lack of startup funding it can be incredibly difficult to help startups to find appropriate funding to enable growth.

COMPLEMENTARY MODELS

Business Services: Using your expertise to perform tasks that deliver a service for others
Space Rental: Renting out space for long term use
Machine Access: Providing access to machines, tools, or other equipment for individuals or businesses to use

BUSINESS MODEL CANVAS

Key partners	Key activities	Value propositions	Customer relationships	Customer segments
• Local businesses and industry experts and experienced mentors for specialized support. • Investors or venture capital firms to connect startups with funding opportunities. • Academic institutions or other organizations to foster innovation and skill development.	• Finding and attracting appropriate startups • Building the skills of the entrepreneurs • Connecting them with appropriate resources	• Expert mentorship and guidance from experienced professionals • Access to a makerspace for prototyping and production • Networking opportunities and access to funding. • Community and collaboration with peers	• Personalized guidance even if following a standard curriculum. • Building a strong and supportive community to foster lasting relationships	• Entrepreneurs and newly formed startups developing their product • Young businesses growing their market and scaling up operations • Private sector, government entities, or NGOs that want to support the creation and growth of startups
	Key resources		**Channels**	
	• Deep expertise • Well-equipped makerspace • Networks of mentors, industry experts, and investors		• Online platforms • Events, workshops, and networking sessions • Referrals from past or current startups	
Cost structure			**Revenue streams**	

• Cost of staff time working to support the startups • Equipment and facility maintenance costs. • Marketing and promotional costs including running networking events • Seed funding for startups if this is part of the model	• Service or membership fees: Charging startups directly for the services you offer • Running support programs funded by other organizations that want to support startups • Equity or profit-sharing agreements with startups in exchange for support

CONSULTANCY

GENERALITIES

Using your expertise to solve problems or deliver outcomes for others. In person versus remote. Advisory versus taking on responsibility to deliver a project or result. Commercial contracts versus donor funded work to deliver social impact. Some potential impacts of the consuktancy model are:

- Helping to increase your impact e.g. supporting the creation of new makerspaces
- Supporting industry and other organisations to maximise their effectiveness
- Using your skills to deliver social impact in a variety of ways leveraging donor funding

Avantages	Challenges
• People who run makerspaces tend to have a range of skills that often lends itself well to consultancy, and there are opportunities for it almost everywhere.	• The sales cycle can be long, particularly with donor funded projects, and there is often uncertainty over project timings making resource planning difficult. • High levels of expertise are needed as well as soft skills to ensure high quality delivery and good client relationships.

COMPLEMENTARY MODELS

Business Services: Using your expertise to perform tasks that deliver a service for others
Marketplace: Creating a mechanism for many buyers and sellers to find each other

Product Development: Designing and prototyping new or custom products

BUSINESS MODEL CANVAS

Key partners	Key activities	Value propositions	Customer relationships	Customer segments
• Other consultancies, particularly established ones with good client relations but lacking in some technical skills • Networks of peers to enable you to find solutions and identify other experts • Government and charities that want to support local industry	• Attracting clients • Developing your expertise • Advisory or project delivery **Key resources** • Expertise • Reputation • Networks of other experts to draw on	• Expert Guidance • Delivery of better solutions than the client could get by themselves • Proven methodologies or a track record of good results • Ability to bring a group of experts together with the right mix of skills	• Personal service to develop customised advice and solutions • Trust based relations • Ongoing support **Channels** • Build relationships with organisations • Collaboration with existing networks • Joint funding applications	• Entrepreneurs, startups, and businesses that need advice on product development • Humanitarian and development projects that need delivery expertise • Businesses, NGOs or government institutions that need advice or support with their own operations

Cost structure	Revenue streams
• Cost of time spent on the specific consultancy project • Cost of time spent in learning and skill development • Travel or other incurred costs • Any equipment or materials • Marketing or advertising costs	• Charge those who have a challenge they want help with – either in the form of time and materials (a daily fee plus any direct costs incurred) or a fixed fee for a project. • Public, development, or humanitarian funding to pay for activities with positive social and economic impact

BUSINESS SERVICES

GENERALITIES

Using your expertise to perform tasks that deliver a service for others (e.g. building web sites). Offering services in person versus online. Standardised versus personalised services. One-off delivery of a service versus ongoing provision. Some potential impacts of the business services model are:

- Support businesses in your community by making it easier for them to focus on their core operations
- Introduce technical or business skills not readily available locally to make local industry more competitive
- Providing employment and livelihoods to the people performing the services

Avantages	Challenges
• This can allow you to use technical or business skills you have available in your team or community to earn additional revenue	• Managing customer relationships, understanding their requirements, and project management for on-time delivery and profitability are all important aspects of this as well as being good at delivering the service itself. • The market can be very competitive, particularly for services offered online for the global market.

COMPLEMENTARY MODELS

Training: Supporting others to develop knowledge and skills with the focus on education and certification
Startup Support: Supporting new business creation and growth

via a combined package
Membership: Creating shared access to a community and/or other assets (space and equipment)
Marketplace: Creating a mechanism for many buyers and sellers to find each other

BUSINESS MODEL CANVAS

Key partners	Key activities	Value propositions	Customer relationships	Customer segments
• Other organisations providing services to your target market • Others providing similar services – you may be able to join forces or sub-contract each other • Technical colleges or other educational institutes who provide training in the type of services you offer	• Attracting customers • Understanding customer requirements • Performing the service **Key resources** • Expertise or skills • Any equipment necessary e.g. computers • Good internet connection essential for performing services remotely	• Good quality outcomes • For local clients – offering understanding of the local context • For remote clients – the ratio of quality to price will be important as you will be competing globally • Offer a personal touch for services not readily available locally	• Mainly personal service • Some co-creation with clients **Channels** • Sell to users of your space • Social media & local advertising • Online channels for services that can be performed remotely	• Those in your community who need the service in question (it may not only be businesses) • Those elsewhere in the world who want remote services • Government or donor organisations who may subsidise provision of services to certain groups
Cost structure			**Revenue streams**	

• Time spent and materials used in performing the service • Advertising & marketing costs • Cost of any machinery or equipment used in performing the service, e.g. computers, printers	• Charge for time and materials (any direct costs) in performing the service • Fixed fee for the project or service outcome • Ongoing charges for repeat services or maintenance • Funding from government or charities for marginalised groups to get access to services, e.g. marketing services for informal sector artisans

EVENTS AND EDUTAINMENT

GENERALITIES

Organising events and fun activities where the focus is on the experience, and learning happens along the way. Periodic bespoke events such as hackathons versus repeat activities such as fun educational classes for children; participants paying to take part versus other entities paying the associated costs. Some potential impacts of the Events & Edutainment model are:

- Inspiration – getting more people excited about STEAM subjects (Science, Technology, Engineering, Art, Maths) and innovative approaches to problem solving
- Improving skills of participants (both technical skills and soft skills such as working together) – can help to improve their opportunities
- Catalysing the formation of startup businesses or social ventures by bringing people together to solve challenging problems

Avantages	Challenges
• This can be an excellent way to generate interest in technology, innovation, or related subjects. The combination of educational content with fun activities is something many people are prepared to pay for.	• It can be difficult to do well – effort & creativity is needed to develop engaging content (though there is lots of inspiration online) • One-off events may generate excitement but not create lasting impact – you need to think in advance about how you can support participants beyond a single interaction

COMPLEMENTARY MODELS

Training: Supporting others to develop knowledge and skills with the focus on education and certification
Startup Support: Supporting new business creation and growth via a combined package
Sale of Materials: Selling materials that others can use to make products

BUSINESS MODEL CANVAS

Key partners	Key activities	Value propositions	Customer relationships	Customer segments
• Schools, colleges, universities or other education bodies • Organisations with an interest in generating solutions to challenges e.g. finding uses for waste • Organisations looking to support the growth of new businesses • Organisations looking for innovative entertainment options	• Connecting with customers • Developing content • Running events & activities • Follow-up support **Key resources** • Personnel to run events • Creative activities or real world problems to work on • Event location and any equipment or materials needed	• Taking part in a fun & educational experience • Childcare can be part of value proposition for events aimed at children • [To companies] Chance to engage customers or potential workers in a different way • Potential to create innovative solutions to challenges	• May be one-off or repeat interactions • Often based around co-creation – you providing a framework, customers making their own experience from that **Channels** • Social media & local advertising to participants, or via education bodies • Build relationships with organisational partners • Referrals important	• Children • Adults who want to enjoy themselves while learning • Young people who want to gain experience relevant for work • Those who want to meet others with similar interests or form teams to tackle challenges
Cost structure		**Revenue streams**		

• Time to develop ideas and content • Time to run events • Space [if delivered in person] • Equipment or materials • Marketing	• Fees to participants • Charge organisations who need solutions to problems • Sell kits for people to do activities by themselves • Sponsorship of events by companies as a CSR* initiative, a marketing initiative, or to help them hire good candidates • Blended models where individuals pay part of the cost and companies / govt / donors pay the rest

Conclusion

The Open Makerspace Toolkit is a powerful resource, democratizing access to tools and knowledge for fostering innovation across diverse communities. Empowering individuals and groups to explore, experiment, and create, unlocks a vast potential for problem-solving, entrepreneurship, and community engagement. This toolkit is not merely a collection of information and resources; it represents a philosophy of open access, collaboration, and learning by doing and recognizes the inherent creativity and ingenuity within individuals and communities, providing the platform and tools to bring their ideas to life. The true success of the Open Makerspace Toolkit lies not solely in its features and functionalities, but in its ability to spark a movement. It catalyses building vibrant maker communities, where individuals of all backgrounds can learn, share, and create together. The Open Makerspace Toolkit is not a static resource but rather a launchpad for continuous growth and innovation. It thrives on ongoing improvement, collaboration, and user feedback. Embracing these principles ensures the toolkit's relevance, effectiveness, and long-term impact.

Additional resources

SETUP, ORGANISATION AND EQUIPMENT

Name of the ressource	Type of Ressource	Subject/Topic	Developped by	Link	Language
Social innvation in action through makerspaces	blog	Definition of Makerspaces, interactions between Makerspaces and social innovation	Future learn	link	English
MAKERSPACES FOR ECONOMIC DEVELOPMENT AND SOCIAL COHESION	blog	Informations on the Maker movement, importance of makerSpaces in education, Makerspaces as a continuous source of knowledge	Esther Fuldauer	link	English
Social Innovation, Democracy and Makerspaces	article	Article containing: etymology of Makerspaces, definition of Makerspaces, Maker space possibilities	Adrian Smith	Link	English
WHY MAKERSPACES ARE THE KEY TO INNOVATION	blog	Location of Makerspaces, Makerspace: a place where we find a range of activities Location of Makerspaces, Makerspace: a place where we find a range of activities	MATTHEW LYNCH	link	English
Creation Crate Blog ressources	Blog	Series of content will help understand how to start, run, and being involved in a Makerspace	Creation Crate Blog	Link	English
Creating a Makerspace That Works	Research Article	Information on how to set up a makerspace	Jamie Back	Link	English
Starting a Makerspace: 5 Things Every Administrator Needs to Know	Blog	Information on how to set up a makerspace	Dr. Jacie Maslyk	Link	English
Sustainable in Action: From Intention to Environmentally Friendly Practices in Makerspaces Based on the Theory of Reasoned Action	Article	Information on how to set up a makerspace	Antje Klemichen Ina Peters* Rainer Stark	Link	English

State of the Art of Makerspaces – Success Criteria when Designing Makerspaces	Article	Information on how to set up a makerspace	ScienceDirect	Link	English
Makerspace Resources	Blog	Information & resources about makerspace design and set-up	Diana Rendina	Link	English
How to Start A Makerspace	Article	Information on how to set up a makerspace	Brillant Labs & Labo Creatif	Link	English
Establishing a maker culture beyond the makerspace	Article	Information on how to set up a makerspace	Karen Beavers, Jennifer Esteron Cady, Amy Jiang and Liberty McCoy	Link	English
How to Start a Makerspace Planning and Resource Guide	Article	Planning and Resource Guide to start a Makerspace	Diana Rendina	Link	English
How to develop a makerspace: from proposal to production	Article	Provide Key element to consider when setting up a Makerspace	Reid Fuente, Suzy Dorsey, Devin Spatz, Cameron Crasto and Zach Patterson	Link	English
Des communs informationnels aux communs éducationnels	Article	Information on Makerspace, Definition (French)	Stéphanie Leyronas,	Link	French
Innovation numérique et transformation structurelle des économies africaines francophones	Article	Information on Makerspace, Definition and Opportunities (French)	Kako Nubukpo	Link	English
Technology-transfer offices and academic open labs as different types of organizational intermediaries in science-society relationships	Article	Information on Makerspace, Definition (French)	Valérie Mérindol, Emilie Pauline Gallié, Ignasi Capdevila	Link	English

THE ESSENTIALS YOU NEED TO BUILD YOUR MAKERSPACE	Website	Tips on how to build a makerpsace	OfficeMax	Link	English
HOW TO SET UP AND RUN A MAKERSPACE	Blog	Information & resources about makerspace design and set-up	Moritz Walter	Link	English
How to Build a Safe Makerspace	Article	Information & resources about makerspace design and set-up	Future Learn	Link	English
How to choose the best management software for makerspaces	Blog	Information & resources about makerspace design and set-up	L Walker	Link	English
Makerspace Collaborating on Sustainability Projects	Blog	Insights and Information on various projects examples to run in makerspaces	Williams	Link	English
Science 3D: Discovery, Design & Development through Makerspaces	Book	Research on the pedagogical aspect of makerspaces	Dr. Janette Hughes	Link	English
How to Setup a Digital Makerspace	Video	How to Setup a Digital Makerspace	Youthlink Scotland	Link	English
How to level up your library makerspace	Blog	How to Set up and organise a Makerspace library	Artefacto	Link	English
Incentives and Ingredients for Building a Makerspace	Blog	How to Setup a Makerspace	FormLabs	Link	English
Tips to Start your New MakerSpace	Blog	Tips to Start your New MakerSpace	S&S Blog	Link	English
EQUIPMENT & TOOLS IN THE MAKERSPACE AT HUB & SPOKE: IMPLEMENTS FOR INNOVATIO	Blog	Case study and example of Makerspace	STEPHANIE DECKER	Link	English
Equipment in the Innevation Center Makerspace	Website	Case study and example of Makerspace	University of Nevada, Reno Innevation Center	Link	English

The DWA project Training	Website	Workshop and Training Videos on Woodworking and Social innovation	Digital wood artisan	Link	English

MANAGEMENT, HUMAN RESOURCE, SAFETY AND REGULATION

Name of the ressource	Type of Ressource	Subject/Topic	Developped by	Link	Language
Circular Makerspaces	Article	Information on Makerspace, Definition and Opportunities	Sharon Prendeville ORCID Icon,Grit Hartung,Clare Brass,Erica Purvis &Ashley Hall	Link	English
Makerspace projects	Blog	Repository of project to run in Makerspaces	Makezine	Link	English
The Exploratorium Projects	Website	Close to 51 “open source” project for activities in the makerspace	The Exploratorium	Link	English
Makerspace: Policies and Procedures	Blog	Example of Policies and Procedure for Makerspace	Miami University Libraries	Link	English
Phrase: makerspace tips	Website	Compilation of Case studies and tip on how to design and Manage a Makerspace	Amtek Company, Inc.	Link	English
Innovation Junction: a Guide to Makerspaces in Coworking Environments	Blog	Insight on the collaborative nature of Makerspaces	Helga Moreno	Link	English
3D PRINTING, MAKERSPACES AND INNOVATION: A BRICOLAGE PERSPECTIVE	Article	Information on Makerspace, Definition (French)	Ahmad Beltagui1 , Achilleas Sesis1 , Nikolaos Stylos2	Link	English
Defining and Differentiating the Makerspace	Book	Information on Makerspace, Definition (French)	Tonia A. Dousay	Link	English
Makerspaces as Social Innovation and Entrepreneurship Learning Environments: The DOIT Learning Program	article	Definition of Makerspace, role of Makerspace in Eduction, Case study	Eva-Maria Hollauf, Veronika Hornung-Prähauser, Sandra Schön	link	English

Educating young social innovators from 6 to 16 in makerspace settings: Case studies of existing approaches and their implications for the European Initiative DOIT	PPT presentation	Role of Makerspace in Eduction	Eva-Maria Hollauf BA	link	English
MAKERSPACES AS SOCIAL AND TECHNOLOGICAL INNOVATION PLATFORMS	blog	Information on Makerspace, Definition (French)	Digital wood artisan	link	English
Makerspaces: A catalyst for Africa's creativity, innovation, hands-on learning	blog	Development of Makerspaces in Africa, success and impact rate of Makerspaces	By Edugist	link	English
Social innovation: what it is, why it matters and how it can be accelerated	Paper	The growing importance of social innovation, Understanding social change	Geoff Mulgan with Simon Tucker, Rushanara Ali and Ben Sanders	Link	English
Key elements of social innovation	Blog	This article describes four key elements: social technology, innovation intermediaries, people who drive innovation and openness	Allyson Hewitt	Link	English
Social Vouchers: Innovative tools for social inclusion and local development	Article	The paper explores the role of social vouchers as a tool for social inclusion and local development	OECD	Link	English
Building local ecosystems for social innovation	Article	This article presents a preliminary framework for analysing social innovation ecosystems at the local level	OECD Local Employment and Economic Development (LEED) Papers	Link	English

The guide to the seven key questions all social entrepreneurs must ask themselves	Article	Guide designed to have clearer ideas and some useful tools in pocket to develop projects and maximize the social impact	ASHOKA	Link	English
ASHOKA ; NGO focussing on social innovation	Website	Build and amplify the global movement in three stages: identify and support the world's leading social entrepreneurs, Accelerate the "Everyone a Changemaker", Equip Everyone	ASHOKA	Link	English
Social innovation tool kit	Article	A toolkit to support social innovation and social entrepreneurship initiatives	Simón Peña-Fernández	link	English
Social innovation: Comparative perspectives	Book	social innovation – understood as organizations' capacity to generate novel ideas, ways and means of doing things, of addressing public and social problems	Helmut Anheier, Gorgi Krlev, Georg Mildenberger	link	English
Social innovation for creating a smart future	article	Informations on social innovation: classification, evolution; organizational	Sang M. Leea, Silvana Trimib,	link	English
Social Innovation in the Built Environment: The Challenges Presented by the Politics of Space	article	This paper reports on social innovation systems for building resilient communities within different social and political contexts across four continents	Donagh Horgan and Branka Dimitrijević	Link	English

Standford Social Innovation Review	Journal	How recognizing trauma in ourselves, other people, and the systems around us can open up new pathways to solving social problems	SSIR	link	English
What Is Social Entrepreneurship? A Guide	blog	Definition of social entrepreneurship, Entrepreneurship Vs Social entrepreneurship	Coursera staff	link	English
6 Social Entrepreneurship Examples and How to Set Up a Social Enterprise	blog	Definition of social entrepreneurship and informations on how to set up a social enterprise	Futurize: Moritz Gripp	link	English
Social entrepreneurship: Creating new business models to serve the poor	article	Article defining Social Entrepreneurship (SE) as a new phenomenon, Social entrepreneurship in support of sustainable development goals	Christian Seelos and Johanna Mair	link	English
Social Innovation Academy	website	A course on how to create social impact and systemic change	Social innovation Academy team	link	English
Social Innovation – the What, Why and How	blog	Definition of social innovation, main importance of social innovation	Diana Porumboiu	link	English
Social Innovation: Blending Business with Impact	blog	business can be a vessel for positive change	Lindsey Hayden, Silvia Mah, Emily Seeba	link	English
Social Innovation lab	website	Short details about social innovation Lab	Pune international center	link	English
Reinventing social innovation.	blog	Presentations on innovation mindset	Project innovation:	link	English

Social innovation for public service excellence	document	Document presenting Social innovation as a response to challenges such as : a brake on sustainable economic growth, leading to inequality and instability in society, and impinging upon the general well-being of their population	Simon Tucker	link	English
Social Innovation: 7 practical steps to promote it at regional level	blog	Steps to promote Social innovation: preparation, build, strenght, support, invest, sitting up and promoting exchange	Guadalupe de la Mata	link	English
Innovation frugale, effectuation et Fablabs : des pratiques à croiser pour penser l'innovation différemment	Article	L'article contient : definition de l'innovation frugale, les points convergents entre l'innovation frugale et l'entrepreneuriat effectual, Innovation frugale, fablab et développement durable	Sandra Fagbohoun	link	French
Making Maker Space: An exploration of lively things, urban placemaking and organisation	Article	Provide insight on how makerspace can interact with local environement	Abigail Schoneboom	Link	English
SCHWAB foundation for social entrepreneurship	Website	List of pertinent blogs talking about social innovation	SCHWAB foundation	link	English
What Is Social Innovation?	article	Definition of social innovation	Sol Price center for social innovation	link	English
11 Blogs Every Social Innovator Should Be Reading	blog	List of pertinent blogs talking about social innovation	Kayla Kurin	link	English

Three strategies to boost social innovation	blog	1. Connecting science with society, 2. Frameworks for action, 3. Public participation	David Murillo	link	English
NESTA toolkits	Website	Collection of well designed toolkits by NESTA; some thematically relevant	Nesta	Link	English
Innovate UK INNOVATION CANVAS	Website	Canvas tool designed to help you create value from innovation and identify the changes needed to make your idea succeed.	Innovate UK Business Connect	Link	English

SUSTAINABILITY

Name of the ressource	Type of Ressource	Subject/Topic
Making, Hacking, Coding: Fablabs as Intermediary Platforms for Modes of Social Manufacturing	Article	Information on the social, Open and i Makerspace for sustainability
Social innovation for sustainable living	article	The Role of Social Innovation in Susta
Novel ways in which social innovation can tackle biodiversity loss	article	A new study at the diverse use of the term in scholarship around sustainability action and tackling biodiversity loss
Social innovation for biodiversity: A literature review and research challenges	article	Article containing: social innovation ta main drivers of biodiversity loss, Socia innovation for biodiversity focuses on action for changing practices
Social Innovation as a Driver for New Educational Practices: Modernising, Repairing and Transforming the Education System	article	Article recomanding that the SI-DRIVE concerning education and lifelong lea potential social innovation could have this policy field and its systems
Cultivating sustainable developments with makerspaces	Article	Insight on how to sustain a makerspa
Sustaining a Makerspace	Article	Insight on how to sustain a makerspa
Design Principles for Teaching Sustainability Within Makerspaces	Article	Insight on how to sustain a makerspa
Sustainability at the MakerSpace	Blog	Insight on how to sustain a makerspa
How to cultivate sustainable developments in makerspaces	Article	Insight on how to sustain a makerspa
Makerspace for Sustainability: University-community Learning Collaborations with RCE Severn	Presentation	Insight on how to sustain a makerspa
Sustainability Considerations in Digital Fabrication Design Education	Article	Insight on how to sustain a makerspa
Co-creating social and sustainable innovation in Makerspaces and Fab Labs.	Article	Insight on sustainability for Makerspa project

HANDWORKING

Name of the ressource	Type of Ressource	Subject/Topic	Developped by	Link	Language
The DWA project Manual	Manual/ Book	Manual containing the results of the comparative study in Europe on the old and new woodworking techniques, machines and tools used.		Link	English
Co-creating social and sustainable innovation in Makerspaces and Fab Labs. Lessons learnt from the SISCODE European project	document	Document containing cultural role of Makerspaces and Fab labs, details about SISCODE (Makerspaces and Fab labs pilot projects)	Carla Sedini, Asger Nørregård Rasmussen, Marion Real, Laura Cipriani	link	English
Moving from makerspace to dynamic innovation space	blog	Using of tech to support collaborations, making the transformation	Nick Swayne	link	English
The role of makerspaces in innovation processes: an exploratory study	article	informations such as: Evolution of Makerspaces, innovation process, main resources, Makerspaces are using more as facilitators	David Zakoth, Oliver Mauroner, Jutta Emes	link	English
A Makerspace Network as Part of a Regional Innovation Ecosystem, the Case of Emilia-Romagna	article	Article detailing Makerspaces and their networks : global, continental, international, national, regional and local. Case study of a Regional Makerspace Network	Andrea Cattabriga	link	English
Innovation Junction: a Guide to Makerspaces in Coworking Environments Helga Moreno	blog	Users of a Makerspace, Design of a Makerspace, Building a makerspace ecosystem	Helga Moreno	link	English

Open social innovations dynamics and impact: Exploratory study of FabLab network	document	The results of the study of Centres for Maker Innovation and Technology (CMIT)	Thierry Rayna and Ludmila Striukova	link	English
Organisation for Economic Cooperation and development (OECD): Social innovation	online library	Projects and workshops on social innovations	OECD	Link	English
Social innovation tool kit	book	This toolkit was designed to help cities integrate social innovation in their path towards Climate Neutrality, A process has been provided: Analyze context, Reframe problem, Envision alternatives, Prototype and experiment, Evaluate and scale,	Net Zero Cities	Link	English
Social innovation tool kit	book	find links between big issues and the smaller actions that Europeans can initiate as social innovators. It also offers an opportunity for collaborations across Europe	European social innovation competition	link	English
Digital social innovation: An overview and research framework	article	DSI involves the use of digital technologies in the development and implementation of innovative products, services, processes and business models	Israr Qureshi, Shan L. Pan, Yingqin Zheng	link	English
A Spectrum of Open Social Innovation Within Social Enterprise	article	This paper explores the use of OSI as a means of achieving social change through two in-depth, longitudinal, qualitative case studies with Scottish SEs	Lauren Tuckerman, Julie Roberts and Geoff Whittam	link	English

THEORETICAL APPROACHES TO SOCIAL INNOVATION	article	Article containing: Theories of Social Change, Social Innovation Studies, Innovation and Management Studies	Anna Butzin et al	link	English
Digital Technologies for Social Innovation: An Empirical Recognition on the New Enablers	article	The article offers empirical recognition to SI by investigating and intends to capture SI core businesses	Donagh Horgan, and Branka Dimitrijevic	link	English
The open book of social innovation	book	Book containing: The process of social innovation, Connecting people, ideas and resources, Ways of supporting social innovation	Robin Murray, Julie Caulier-Grice and Geoff Mulgan	link	English
TOWARD A THEORY OF SOCIAL INNOVATION	book	Book containing: definition of social innovation, The social innovation process,	Kristen Pue, Christian Vandergeest, and Dan Breznitz	link	English
Social Innovation: Field Analysis and Gaps for Future Research	article	Article containing advances in social innovation in the literature and presents the most cited authors, including the co-authorship networks and concentration of study areas	Jaiarys Capa Bataglin, Isak Kruglianskam	link	English
The history of social innovation	article	Article containing informations about history of social innovation	Ola Tjornbo	link	English
Investing in the Future: Why Social Innovation Startups Are Attracting Funding	article	Article containing main answers on atttraction of funding by social innovation	faster capital	link	English
Toolkit of All Toolkits for Social Innovation	blog	A toolkit on how to invent, adopt, or adapt ideas that can deliver better results	Guadalupe de la Manta	link	English

Design strategy for social innovation	pdf	Instructions intended to accompany educators	Penny Herscovitch & Dan Gottlieb	link	English
Social innovation guide for practitioners	article	Article containing a seven step guide to develop social innovation	SIMRA social innovation in marginalised rural areas	link	English
Contributions et coordination des makers face à la crise du Covid-19	Article	L'article contient des informations sur les makers face au Covid-19: cadre théoriques, résultats préliminaires	Robert Viseur et Amel Charleux	Link	French
Co-création de valeur et innovation sociale : l'exemple des living labs	Article	L'article a pour résultat: Compréhension du processus de co-création de valeurs d'usage, d'échange et sociale par les living labs Dévoilement de la fragilité de la co-innovation multi-parties prenantes des living labs	Ingrid Fasshauer	Link	French
La performance des lieux de cocréation de connaissances Le cas des FabLabs	Article	L'article contient des points tels que: FabLab, tiers lieux et cocréation de connaissances et Une analyse empirique de la performance des FabLabs	Raphaël Suire	Link	French
Le déploiement des innovations sociales numériques dans les fablabs	Article	L'article propose d'approfondir la notion d'innovation sociale numérique, domaine de recherche en gestation, au travers d'une étude circonscrite à l'un de ses champs d'application	Maud Pélissier	Link	French
Retour sur l'atelier "Communs services de proximité" en Bretagne au Tilab	Article	L'article présente l'atelier dans son ensemble	Michel Briand	Link	French

DIGITAL FABRICATION

Name of the ressource	Type of Ressource	Subject/Topic	Developped by	Link	Language
Printable	Website	Open 3D design for 3D printing projects	Printable	Link	English
Makerspace MekTro	Training ressources	Information on rules and regulations, training content, instructions and manuals, opening hours and reservations, and a forum for DIY prototypers.3D printing,Lazer cutting, Electronics and Soldering	University of Renne (France)	Link	French
Creation Crate Blog ressources	Blog	Electronics tutorials, videos, and courses.	Creation Crate Blog	Link	English
Careables Training Kit: Design and 3D technologies for Healthcare	Website	Online course on 3D technologies for health	Careables	Link	English
DIY PROJECTS	Tutorials	Electronics project for the Makerspace	Sew Electric	Link	English
OBRARY: library of open designs	Website	Ebooks & Free designs for CNC router and laser cutter	Scott Austin and Eric Schleiche	Link	English
Maker Pro	Website	Electronics projects and tutorials for the Makerspace	EETech Media, LLC	Link	English
Amtek Company, Inc. Sample files	Website	Open Source STL Sample files for 3D printing projects	Amtek Company, Inc.	Link	English

Open Makerspace Toolkit

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