



Designing a Material Library

A Structured Research Guide
and Design Framework

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Introduction

This guide supports libraries, makerspaces, educators, facilitators and cultural organisations that want to create or improve a material library.

A material library can take many forms: a small collection of samples in a public library, a physical archive connected to a makerspace, a sustainability-focused collection, or a digital catalogue linked to materials, suppliers, techniques and activities. The goal of this guide is not to define one single model, but to help you make informed decisions. Each chapter can be used as a standalone resource, depending on where you are in the process: understanding the value of a material library, choosing a model, looking for references, organising materials, setting up a physical collection, or building a digital catalogue.



credits: Material ConneXion MCX - New York

How to Use This Guide

This guide is organised into six chapters, each focusing on a different step in designing, setting up, and managing a material library: from understanding its purpose and choosing a model, to categorising materials and building both physical and digital collections.

You do not need to read everything in order, but we suggest below to follow the chapters progressively if you are starting from scratch: first clarify the purpose of your material library, then choose the model that best fits your context, explore case studies, define how to categorise materials, and finally move on to building the physical and digital collections.

Start from the chapter that best matches your current need, then return to the others as your material library grows.

Start with **Chapter 1 – Why Create a Material Library?** to understand what a material library is, why physical samples still matter, and how material libraries can support learning, making, sustainability and creative discovery.

Move to **Chapter 2 – Material Library Models** to explore different types of material libraries and identify which model best fits your context, users, resources and goals.

Use **Chapter 3 – Material Library Case Studies** to learn from existing international examples. This chapter can help you compare different approaches to collection design, access, storage, governance, cataloguing and digital tools.

Go to **Chapter 4 – How to Categorise Materials** when you need to decide how to organise your collection. It introduces different classification systems based on material families, composition, form, technical properties, sensory qualities, manufacturing processes, applications, sustainability criteria and lifecycle.

Use **Chapter 5 – Building a Physical Material Library** when you are ready to collect, label, store, display and manage physical material samples. This chapter offers practical steps, from defining the scope of the collection to creating material cards, storage systems and maintenance guidelines.

Use **Chapter 6 – Setting up a Digital Material Library** when you want to create a searchable digital catalogue connected to your physical samples. This chapter explains how to structure digital records, choose a platform, use tags and filters, and connect samples to online information through QR codes.

Chapter 5

Building a physical material library

Step 1: Define the Scope of the Materials Library

Before collecting materials, establish the purpose and scope of your materials library. A clear collection policy will help ensure that the library remains organised, relevant, and manageable over time.

Define the Purpose

Consider the primary goal of the library. For example, is it intended to:

- Support design and material selection
- Inspire creativity and innovation
- Promote sustainable material choices
- Support teaching and research
- Provide reference samples for fabrication and prototyping

The purpose will influence the types of materials you collect and how they are organised.

Identify Your Users

Define who will use the library. Your audience may include:

- Students
- Designers
- Makers
- Researchers
- Educators
- Industry partners
- Members of the public

Understanding your users will help determine the level of technical information required and the most appropriate organisation system.

Determine the Collection Size

Estimate the number of materials you intend to manage. Starting with a smaller collection (for example, 50–100 samples) makes it easier to develop consistent cataloguing and storage practices before expanding the library. Defining the scope at the beginning of the project creates a coherent collection and establishes clear guidelines for future growth.

Step 2: Collect and Prepare Material Samples

Sample Size

Recommended:

- Fabric: 10 x 10 cm
- Sheet materials: 10 x 10 cm
- Filaments: 20–30 cm
- Granules: small sealed jar
- Powders: sealed transparent container

Requirements

Every sample should:

- ✓ Be clean
- ✓ Be safe to handle
- ✓ Be clearly labelled
- ✓ Have matching digital records

Step 3: Create Standard Sample Material Cards

Create a Material Card for each material to register and categorise it in the library.

Complete the **Material ID Template**, which you can find at the end of this document.

Fill in all the requested information about the material. If you prefer, you can print the template and complete it by hand. Once finished, attach a QR code that links to the material's digital record.

ID Material : how to fill it in?

1. Name the Material

On the top left assign every material a unique identifier (e.g. MAT0001, MAT0002, MAT0003). This identifier should remain with the material throughout its life in the collection and be used on the material card, digital catalogue, storage location and QR code.

1. Photograph the Material

Take clear photographs of the material, including:

- An overall view of the sample
- A close-up showing the texture
- An example of the material in use (if available)

Store the images in one of the following locations: Google Drive, SharePoint, Library server. Link the image folder to the material's digital record.

2. Add a brief description of the material

Write a short description that explains the material and its key characteristics.

3. Add storage location to the Material Card

Since you're creating a physical library, every material should have a storage location. Ex. Storage location: Shelf B

4. Categorise the Material

Select:

- Material family
- Main application

5. Record the Source

Include:

- Origin (country or region, if known)
- Manufacturer or supplier

6. Specify the Material Composition

7. Record Physical Characteristics

Recommended:

Weight	Lightweight, Medium, Heavy
Flexibility	Flexible, Semi-rigid, Rigid
Surface	Smooth, Rough, Textured
Feel	Soft, Hard, Elastic

8. Add Sustainability Information

Many makerspaces focus on circular economy principles.

Is it:

Recycled?
Recyclable?
Repairable?
Renewable?
Compostable?
Biodegradable?

Certifications

Examples:

- FSC
- Cradle to Cradle
- OEKO-TEX
- GRS
- Fair Trade

9. Generate QR Codes

Every material should have a QR code.

The QR code links to:

- Digital record
- Material description
- Safety information
- Tutorials
- Supplier information

Attach the QR code:

- To the sample
- To storage boxes
- To display cards

Step 4: Choose an Organisation System

Decide how users will browse the collection. Select one primary organisation method and use it consistently throughout the library.

Possible organisation systems include:

- **By Material Family** (e.g., textiles, polymers, metals, ceramics)
- **By Sustainability** (e.g., recycled, renewable, biodegradable, circular materials)
- **By Application** (e.g., fashion, construction, packaging, electronics)
- **By Manufacturing Process** (e.g., 3D printing, laser cutting, CNC machining, casting)

Choose the system that best suits your users. Public libraries often benefit from sustainability-based categories, while makerspaces may find material families or manufacturing processes more intuitive.

Step 5: create a digital catalog

Select a platform to store and manage your material records.

Beginner

- Google Sheets

Intermediate

- Notion
- Airtable

Advanced

- Koha
- CollectiveAccess
- Omeka

Your catalogue should include:

- Material ID
- Material name
- Photographs
- Material properties
- Sustainability information
- Storage location
- QR code
- Supplier or source

Step 6: Organize Physical Storage

Arrange the samples according to the organisation system you selected.

Label shelves, drawers, or storage boxes clearly.

Consider using:

- colour coding
- shelf numbering
- section labels
- consistent sample containers

For example:

- Shelf A – Textiles
- Shelf B – Polymers
- Shelf C – Natural Materials
- Shelf D – Metals

A clear visual system makes the collection easier to browse and maintain.

Step 7: Design the Physical Space

Plan how users will interact with the collection.

You might include:

- **Discovery Area** – browse materials
- **Learning Area** – information panels and case studies
- **Testing Area** – compare, touch and examine samples
- **Workshop Area** – experiment with fabrication techniques

Even a small library can benefit from separating these functions.

Step 8: Label and Display Materials

Ensure every sample can be easily identified.

Each material should display:

- Material name
- Material ID
- QR code
- Main category
- Key properties (optional)

Use durable labels that remain attached to the sample or its container.

Step 9: Establish a Loan and Inventory System

Decide whether materials remain in the library or may be borrowed.

If materials can be loaned, record:

- User name
- Material ID
- Borrow date
- Return date

Regularly check that all samples remain in good condition and are stored correctly.

Step 10: Train Staff and Contributors

Provide clear instructions for anyone responsible for maintaining the library.

Training should include:

- Registering new materials
- Updating the catalogue
- Printing QR codes
- Organising storage
- Explaining the collection to visitors

A one-page workflow or checklist can help ensure consistency.

Step 11: Develop Collection Management Guidelines

Define criteria for accepting new materials.

Accept materials that are:

- Safe
- Clearly identified
- Relevant to the collection
- In good condition
- Educational or representative

Avoid:

- Hazardous materials
- Unidentified samples
- Contaminated or damaged materials
- Materials without provenance

This helps maintain a reliable and consistent collection.

Step 12: Review and Maintain the Collection

Schedule a regular review (for example, once a year).

Tasks may include:

- Replacing damaged samples
- Updating material information
- Adding new materials
- Removing obsolete materials
- Reviewing user feedback
- Verifying QR codes and digital records

Recommended Starter Collection (50 Samples)

Textiles (10)	Cotton, Denim, Felt, Wool, Hemp, Linen, Recycled polyester, Canvas, Leather alternative, Biotextile
Polymers (10)	PLA, PETG, ABS, Acrylic, HDPE, Polypropylene, Recycled plastic sheet, TPU, Silicone, Bioplastic
Natural Materials (10)	Cork, Bamboo, Pine, Birch plywood, Stone, Clay, Straw, Natural fiber board, Coconut fiber, Hemp board
Metals (5)	Aluminum, Steel, Copper, Brass, Recycled metal sheet
Paper & Cardboard (5)	Corrugated cardboard, Grey board, Kraft paper, Recycled paper, Honeycomb board
Biomaterials & Composites (10)	Mycelium, Algae sheet, Biofoam, Bioplastic, Cork composite, Hemp composite, Flax composite, Recycled textile composite, Wood-plastic composite, Mushroom packaging

Material *identification*: MAT-00000

photo

Material Name

(e.g. Recycled Denim)

Date Added:

Catalogued By:

Description:

Provide a brief and accessible description (50–80 words).

Material Family

Textile

Biomaterial

Ceramic & glass

Polymer

Metal

Paper & cardboard

Natural materials (wood, stone, etc.)

Coating / Surface Treatment

Composite

Material shape

Sheet/panel

Filament

Granules

Fabric

Film

Powder

Liquid

Foam

Gel

Fibre

Tube

Yarn

other:

Origin

Manufacturer:

Country:

Material composition

es. PLA 80%, fibra naturale 20%

Main application

Fashion

Repair & Mending

Product design

Packaging

Art & Craft

Wearables

Architecture

Accessories

other:

Sustainability

Biodegradable

Recyclable

Compostable

Renewable

Recycled

Repairable

Certifications

Physical characteristics

Weight:

Flexibility:

Surface:

Feel:

Tags

#denim #circulareconomy
#blue #upcycling #recyled
#fashion

