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International Centre for the
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Restoration of Cultural Property



RE-ORG

A METHOD TO REORGANIZE MUSEUM STORAGE

III. Additional Resources

RE-ORG Method:

III. Additional resources



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RE-ORG Method: III. Additional resources

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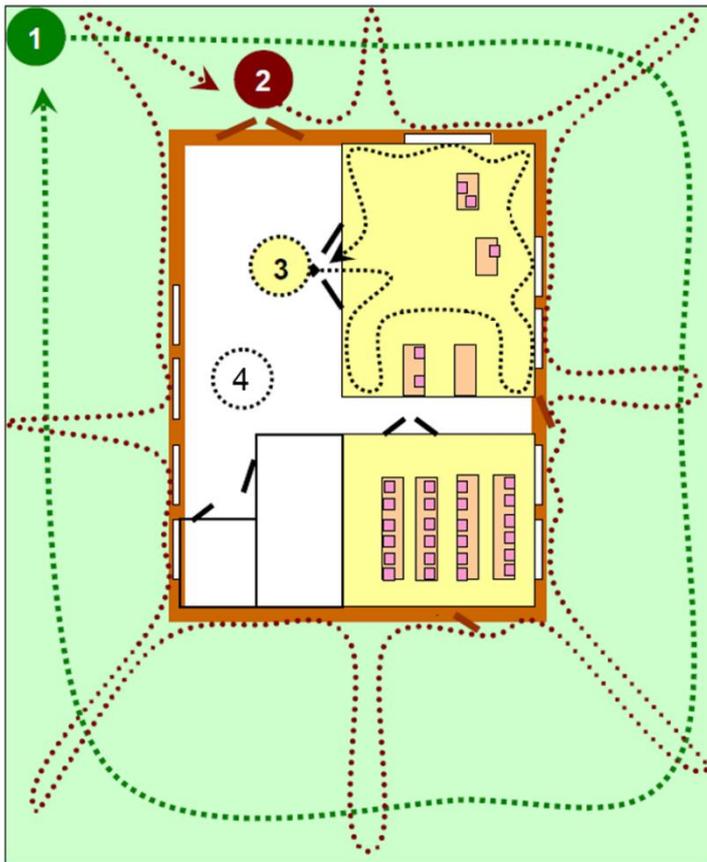
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Resource 1 - Building survey

This could be a very time consuming exercise if you focus on the details. The goal is to identify deficiencies that can have an impact on collections, not to list all the flaws in the building.



Suggested survey path

1. Tour the site
2. Tour the exterior of the building
3. Tour the collection storage rooms
4. Tour the non-collection areas

Figure adapted from "Figure 12. Suggested pattern for a survey of a collection within a building within a site" (p. 82). In: [The ABC Method: a risk management approach to the preservation of cultural heritage](#) (external link).

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This survey method is adapted from: Michalski, S. 2004. "Care and Preservation of Collections - Appendix 1. The visible facts: A suggested survey path, basic set of observations, and set of photographs". [Running a Museum: A Practical Handbook](#) (external link). Paris: ICOM. 84-87.

1. Tour the site



Walk: Around the whole site, 10 m to 50 m away from the building.



Photos: Overall views of front, left, back, and right sides of the building.

Is the building located on a flood plain?

i This is likely not something you can change, but if your building is located on a flood plain, you must pay extra special attention to where collections are stored (and displayed). Search “Flood risk map [your municipality or region]” online to determine your specific exposure to flooding.

Is your building located in a region that is particularly at risk of major natural disasters? (e.g. tornadoes, hurricanes, tsunamis, wild fires, other)

i This is likely not something you can change, but if your building is in a region particularly susceptible to certain types of disasters, mitigation measures should be in place. Search “[Hazard type] + [your municipality or region]” online to find maps that will show your probable exposure to these types of disasters.

Is the nearby land sloped towards the building? How far are the closest rivers? Are there working exterior drains?

i These factors may amplify a flood risk, and in the long term, could compromise the structure of the building.

Can you see public water, drainage and sewage systems that appear to be in bad condition?

i In the event of torrential rains, there would be an increased risk of flooding, and your collection could be affected if it is stored below ground level.

Is there a water main that runs close to your building?

i The bigger the water mains, and the closer they are to the building, the bigger the risk – especially if storage is located below ground level. This is likely not something you can change, but it means that you must pay extra special attention to where collections are stored (and displayed).

Are nearby or attached buildings classified as “industrial” or otherwise used to store high hazard contents? Are any attached buildings, or other occupants that may share your facility, unprotected against fire?

i Potentially dangerous activities that fall outside the scope of your museum’s control – especially if these are occurring in spaces adjacent to yours that are not fire protected – constitute a threat to your collection.

Are fire hydrants available nearby?

i If there are no fire hydrants near your building, the effectiveness of the response by the fire department can be diminished.

Are you located in a high crime-rated area? Is the site poorly lit at night?

i These factors may constitute a heightened security risk.

2. Tour the exterior of the building

Perimeter

 **Walk:** Around the building perimeter, looking at the walls and roof (if necessary, obtain access to view the roof).

 **Photos:** Overall views (wide angle) of front, right, back, and left sides of the building.

Are there gaps or cracks in the walls, or evidence of poor construction methods?

 Because the building is the first line of defence against exterior threats, a compromised building envelope weakens the collections basic protection against all of the agents of deterioration.

Is this a combustible construction? (e.g. wood frame)

 In the event of a fire, if the structure is combustible, the likelihood of a total loss of the building is much higher. This is not something you can change, but it means that your collection is more at risk in the event of a fire so detection, response measures, and procedures will be even more critical.

Are there any exterior vents that do not have screens or barriers to block entry of pests or thieves?

 Exterior vents are a point of entry for pests, and can be an entry point for humans (25 cm x 25 cm is sufficient for a person to get through). This is a risk that can be addressed with screens and security bars and alarms, for pests and thieves, respectively.

Is vegetation around the site overgrown, or is garbage stored nearby?

 These factors increase the risk of pest infestations.

Is the roof flat? Are storm drains, eaves troughs or downspouts visibly failing or damaged?

 Water must be diverted away from the building to protect its structure and indirectly, also the collection. Water tends to pool on flat roofs, so the condition of the waterproofing membrane and of the storm drains are critical to avoid leaks in the spaces below. Defective or damaged eaves troughs may cause damage to foundations or lead to water infiltrations.

Doors and Windows

 **Walk:** Around the building perimeter, looking at the doors and windows (if necessary, obtain access to view the inside of each door and window).

 **Photos:** Take close-ups of locks, gaps, and any signs of poor condition (always take these in sequence with the overall photo of that door / window first).

Doors: Are any locks, hinges, or seals damaged or failing? Are there any large gaps, or evidence of poor construction?

 As above, a compromised building envelope weakens the collection's basic protection against all of the agents of deterioration.

Windows: Are any locks, seals or screens damaged or failing? Are there large gaps or evidence of poor construction?

 As above, a compromised building envelope weakens the collection's basic protection against all of the agents of deterioration.

Are there any other obvious hazards related to the doors and windows?

Describe the security systems in place (check all that apply):

Detection

door and window contacts motion sensors surveillance cameras

storage room(s) alarmed during opening hours

physical presence of trained security guards physical presence of museum staff

Alarm system

Is there an alarm system that is monitored full time? Yes No

3. Tour the collection storage room(s)

 **Walk:** Through each collection storage room. Within each room, walk around the perimeter several times, looking carefully, before taking photos or notes. This can be done for display areas as well, but is not the specific focus of RE-ORG.

 **Photos:** Wide-angle of all 4 directions, each taken from as far away as possible. Begin at the wall with the door, and then proceed clockwise. If the wall photos do not capture the ceiling and floor, take separate photos of both. For each significant observation below, where a particular risk is identified, take a close-up photo.

Are storage room(s) located below the ground floor? If so,

- **are water detectors installed?**
- **are there functional floor drains with backflow prevention?**
- **is there a sump pump?**

 Basement storage locations are particularly at risk of flooding, so having prevention measures in place is of the utmost importance.

Describe the fire protection systems in place:

Automatic sprinklers

___ We have ___ We do not have

Are they inspected annually? ___ Yes ___ No

Which areas are not covered by sprinklers in your building?

 A building with automatic fire sprinklers is far less likely to suffer from total loss as they help limit the spread of fire in its early stages. Sprinklers in storage are good, but sprinklers throughout the building are much more effective, especially since most fires will not start in the storage room(s). It is generally recognized that wet-pipe sprinklers are more reliable and less costly to maintain than dry-pipe or other types of sprinklers.

For those who are worried about sprinklers accidentally discharging over collections: “Accidental discharges and leaks due to manufacturing defects are relatively rare. In addition, damage from sprinklers is generally far less than from high-powered fire hoses used for firefighting. Water discharge from sprinklers is approximately 100 litres per sprinkler per minute dispersed as a gentle ‘rain,’ versus the discharge rate of approximately 500–1,000 litres per hose per minute, discharged under high pressure.” (CCI, [Agents of Deterioration: Fire](#) [external link])

Portable extinguishers

We have We do not have

Are staff trained to use them? Yes No

How often is training organized? every 3 years every 5 years
 for every new staff never

Are they visually inspected by staff monthly? Yes No

Are they inspected by a specialized firm annually? Yes No (explain)

i In the event of a fire, the priority is always life safety, so depending on the situation; it may not always be feasible or advisable for staff to put out fires with extinguishers. That being said, they can be useful to prevent small fires from becoming larger and uncontrollable. Being able to use portable extinguishers properly and access them are critical factors. Monthly visual inspections by staff will mainly ensure they are accessible and usable. Annual inspections by a specialized firm will ensure that they are still functional and properly pressurized. If portable extinguishers are the only way to respond to fire onsite (i.e. no automatic sprinklers), this is all the more important.

Detectors

Are there smoke detectors throughout the building (including storage)? Yes No

Are they wired to the central alarm system? Yes No

Are there heat detectors throughout the building? Yes No

i Smoke detection in storage is important because many slow burning smouldering fires can do a lot of damage to collections before they are sensed by heat detectors.

Alarm system

Is there an alarm system installed throughout the building that is monitored full time?
 Yes No

Is there a dedicated and supervised telephone line for the fire alarm system? Yes No

What climate control equipment or systems are used (check all that apply)?

Portable equipment: humidifiers dehumidifiers heaters fans

Fixed system: heaters (radiators / electric) mechanical ventilation (heating only)
 HVAC

Is plumbing visible overhead, on walls, or near the floor?

i Pipes that run in the collection storage rooms can lead to water incidents, especially if they are pressurized (e.g. water supply lines).

Are there floor drains? Are they placed to provide good drainage? Do they appear to be in good condition?

i Having functional drains (unobstructed and floor graded towards them) is especially important if your storage room is located below ground level, if plumbing runs through the space, or if automatic fire sprinklers are present.

Are lights kept on when the space is unoccupied? Are there any windows in this space that are not blocked to prevent light from entering the space?

i As much as possible, lights should be kept off in storage – particularly if light-sensitive materials are stored on open shelves not inside opaque containers.

Is there any damage or signs of failure on locks, hinges, or seals on doors and windows into this space? Are there any large gaps, or evidence of poor construction? (see Step 2 *Doors and Windows* above)

i Because the building is the first line of defence against exterior threats, a compromised building envelope weakens the collection's basic protection against all of the agents of deterioration.

Any other obvious hazards related to the storage room(s) (e.g. storage of highly combustible or hazardous materials, others)?

4. Tour the non-collection areas



Walk: Through all rooms and halls without any collections.



Photos: Wide angle view of each room (i.e. one towards door, one opposite). Close-up of any relevant observations.

Loading bay: Is it designed to minimize risks?

i If you have a loading bay, is food waste stored here (pest risk)? Can collections enter and exit the building safely without being damaged?

Quarantine room: Are incoming objects isolated for inspection before being introduced into storage?

i A designated room where incoming objects can be isolated and placed under observation minimizes the risks of widespread insect infestations that affect the entire collection.

Electrical systems: How old is this building? If your building is more than 40 years old, are electrical inspections conducted at least every 10 years? Are there any visible signs of damaged electrical wiring?

i Faulty electrical systems represent a fire risk. If the building is older and the wiring has not been redone, the risk could be higher.

Janitorial rooms, washrooms, mechanical rooms, sinks, plumbing, and overflow drains: Are any of these located above storage rooms? If so, what measures are in place to block possible leaks?

i Any source of water above the storage room(s) should be addressed somehow through waterproofing, physical barriers, detection or other measures.

Food preparation, service rooms, and garbage: Are these adequately isolated from areas where collections are stored or likely to transit through?

i Food and food waste attract pests, so areas where these are present should be well sealed and isolated from areas where collections are found. At 10°C insect pest activity slows down considerably, which is why refrigerated garbage rooms for food waste is an effective way to mitigate this risk.

EVALUATION

Based on the information you have collected during the building survey, what are the main issues with regards to the building that should be addressed as part of your reorganization project?



Resource 2 - General floor loading requirements

Below is a list of different storage unit and collection types with corresponding suggested floor loading requirements.

- **Uncompacted racking, shelving or cabinets:** minimum 7.2 kN/m² (150 psf)
- **Picture / painting racking:** 7.2 kN/m² (150 psf)
- **Books and archives stacks, uncompacted:** 13.2 kN/m² (200 psf)*
- **High-density mobile storage:** up to 21.5 kN/m² (250 psf)
- **Temporary and crate storage:** to 13.2 kN/m² (200 psf)
- **Large and heavy objects:** 21.5 kN/m² (250 psf)

Source: Maximea, H. 2012. "Planning for Collections Storage". *Manual of Museum Planning*, eds. B. Lord, G. Dexter Lord, L. Martin. Lanham: AltaMira Press. 250-285.

* Elsewhere for archives: 150 psf for static shelving; 250 psf for compact (Pacifico & Wilsted. 2009. *Archival and Special Collections Facilities: Guidelines for Archivists, Librarians, Architects, and Engineers*. SAA.)



Resource 3 - "How full are my storage units" exercise

This quick exercise demonstrates the key principles of making quick visual estimations of the fullness of your units.



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100%? (completely full?)



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...Or how about 60%?

You could add at least two extra shelves and still maintain safe access to collections. So in this case, 3 out of 5 shelves are used, or in other words, **60% full**.



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Now this one?

Objects of similar sizes have been grouped together, which is the most space efficient solution. Also, the shelf heights have been adjusted to minimize wasted space between shelves. Perhaps a few objects can be added on the bottom shelf... so this unit would be about **95% full**.



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Is this one 100% full?



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...or 50% full?

Depending on the unit type, it can take a little time to add or adjust shelves, but it is well worth your time when you can double the space in a single unit!



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Now if we consider this unit, is it 100% full, or more?



Even if you add an extra shelf to decompress the top shelf, the top 2 shelves will still be 100% full...

...and the other ones are likely to be **at least** 200% full (a very conservative estimate).

So, when you calculate the average $(100\% + 100\% + 200\% + 200\% + 200\%) \div 5 =$ **160% full**



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Any room for improvement here?



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Actually, you could gain one extra shelf if the shelves were adjusted to fit the size of the containers



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In this archival storage room, using similar reasoning to the example above...

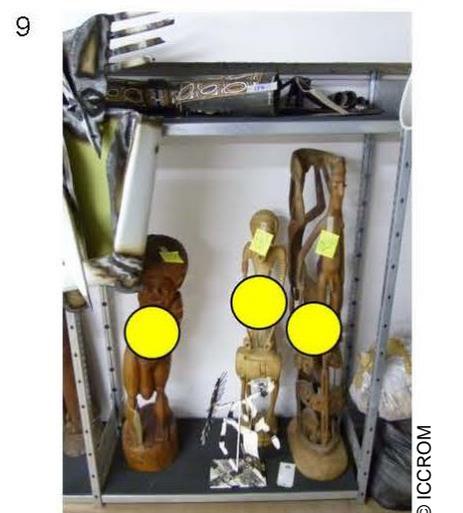
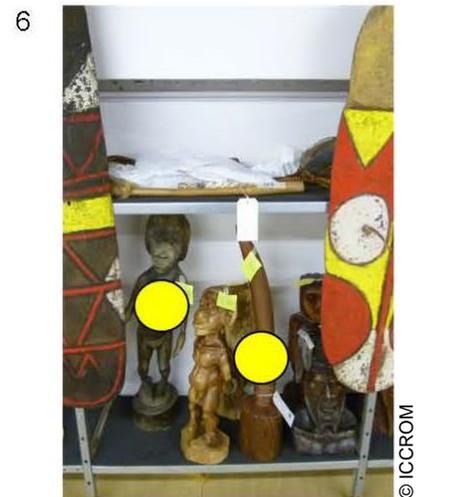
1 shelf is wasted in each bay, so considering that there are 4 bays per rack and 8 racks, that means...

32 wasted shelves, or equivalent to...

2 entire two-sided racks wasted.

The moral of the story: a little wasted space on each unit quickly adds up!

A bit more difficult - You know that the objects with a yellow circle on top will be removed, as they do not belong in storage. How full are these units?





Resource 4 - Products and materials for storage

Use this guide to identify which materials and products could be a potential threat to your most acid-sensitive objects. This tip sheet was developed in collaboration with Jean Tétreault, CCI.

The most acid-sensitive objects

- Metals (especially lead, bronze and brass)
- Colour photographs
- Paper (some papers are already acidic, so the biggest impact will be on non-acidic varieties)
- Shells, coral, limestone
- Cellulose acetate (synthetic objects)

NOTE: Other materials are also sensitive to acids, but to a lesser extent. For a full list of material vulnerabilities, see Appendix 2 of: Tétreault, J. 2003. *Airborne Pollutants in Museums, Galleries, and Archives: Risk Assessment, Control Strategies, and Preservation Management*. Ottawa: Canadian Conservation Institute).

Wood and wood products

Issues

- Wood releases acids that may damage the **most acid-sensitive objects** (see list above); this process speeds up in high humidity conditions. All wood species are a potential threat to acid-sensitive objects.
- Wood products (e.g. MDF, particleboard, and fiberboard) emit acids as well. With wood products, it is more difficult to control the wood species used.



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- Direct contact between **acid-sensitive objects** and wood or wood products.
- Wood that is green, unconditioned and that has knots. The worst species are red cedar, oak [80% of vapours released are acidic], and Douglas fir.



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- If using wood for **acid-sensitive objects** is unavoidable (e.g. existing wooden storage furniture) then storage units can be sealed using latex paint (emulsion). As a general rule, apply one coat of primer and two top coats. The minimum drying time is 4 weeks for a closed cabinet or drawer cabinet, and 4 days for open shelving units. For heavy objects, an anti-abrasive acrylic urethane paint is preferable or a two-part urethane paint. If the objects themselves contain solvents, are oily or greasy, it is best to use two-part epoxy paint. Alternately, the shelves themselves can be lined with a polyethylene foam product, or protective enclosures can be used. If the existing units are already coated, and this was done long ago, they would be safe to use without lining foam – regardless of the type of paint that was used.
- If using wood products for **acid-sensitive objects** is unavoidable, then ensure all surfaces are adequately sealed using the technique described above, or with an aluminized plastic product (e.g. “Marvelseal”).
- Give preference to wood that is aged, conditioned and dry. Some species such as cork are less acidic.
- Use powder-coated metal (best), galvanized and stainless steel, plastic panels or glass.

Coatings (paints, varnishes)

Issues

- Some coatings release high amounts of harmful gases for a long period of time (including acidic vapours) that may damage the **most acid-sensitive objects** (see list above).



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- Oil paints or modified oil paints (e.g. urethane), alkyds, melamine
- One-part epoxy paints (comes in one can)
- Moisture-cured urethane (“marine varnish”)



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- Latex paint (emulsion): moderate barrier against harmful vapours, weak resistance to scratches.
- Shellac: weak vapour barrier, very good to seal knots.
- Two- or three-part epoxy: good vapour barrier; highly resistant to scratches.
- Two-part urethane: good vapour barrier; highly resistant to scratches.
- Metal cabinets that are powder coated (best); coated with baked alkyds (good); but not with unbaked or under-baked alkyds (worst)

For more information about the use of coatings, refer to:

Tétreault, J. 1999. “Coatings for Display and Storage in Museums.” *Technical Bulletin 21*. Ottawa: Government of Canada, Canadian Conservation Institute.

Tétreault, J. 2011. [Sustainable use of coatings in museums and archives – some critical observations](#) (external link). *e-Preservation Science*.

Guidelines for the selection and use of coatings (from: Tétreault 1999)

Uses	Wood products	Metals	Concrete ^a
Enclosures such as display cases and storage cabinets:	Avoid acidic wood such as oak and cedar. All coatings except oxidative coatings ^b are acceptable. Varnishes need more layers. Let the film dry for four weeks.	Powder coating; one day drying period. With two-part epoxy or (properly) baked alkyd coatings wait four weeks.	Not commonly used.
Open structure such as storage shelves, walls and ceilings:	All coatings except oxidative paints ^b are acceptable for all surfaces. Unbaked oxidative paints are only acceptable if they are applied to small surfaces and the ventilation of the room is adequate. Allow the film to dry for four days. Check with the distributor or from technical data that the coating is appropriate for the surface to be coated.		
Floors (special case of open structure):	All coatings except oxidative coatings ^b are acceptable for all surfaces. Select coatings recommended for this purpose. Allow film to dry for four days, or more if specified by the manufacturer.		
Contact between objects and paint film:	For direct contact between objects and painted surfaces, wait four weeks. Interleaves such as plastic sheets (Melinex 516 or Marvelseal 360) can be used after four days of drying. For coated metal surfaces, contact between objects and coatings dried for one day is possible with powder coatings and baked alkyd coatings.		
Display and storage of lead objects in newly painted enclosure or room:	Even after selecting a suitable coating and allowing an adequate drying period, some lead objects, or alloys rich in lead, can be altered by carboxylic acid vapours, especially acetic acid released by coatings or wood products. Avoid the use of coatings for displaying or storing lead.		
<p>a: New concrete surfaces will need to be etched by a muriatic acid solution to improve paint adherence. For old concrete surfaces, trisodium phosphate soap solution (TSP) should be sufficient;</p> <p>b: Oxidative paints include the following: oil-based, oil-based urethane, alkyds and epoxy ester (i.e. epoxy in one paint can).</p>			

Paper



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- Glassine enclosures to store photographs. Glassine paper is made with short, brittle wood pulp fibers, which are prone to rapid decay and has unknown additives to increase its flexibility and translucency. Therefore, glassine should be avoided for photographs because of possible impurities from wood pulp, possible harmful additions, and deteriorating paper fiber.
- Common cardboard boxes to store **acid-sensitive objects** (see list above).

Plastics

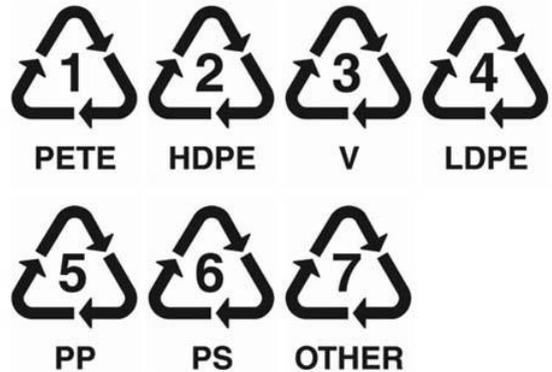
Issues

- Some plastics may release harmful vapours that can damage certain **acid-sensitive objects** (see list above).



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- PVC (Polyvinyl chloride), especially the flexible type: risk of becoming sticky and of corroding acid-sensitive objects caused by benzoic acid (after 5 years); some still look good after 20 years.
- Cellulose acetate: may start to release acetic acid (i.e. vinegar syndrome) and deform after 30 years at room temperature.
- Cheap polyurethane
- Rubbers containing sulfur vulcanizing agents
- RTV silicones (RTV: room temperature vulcanization), the acidic type.



Symbols used to identify the most common types of plastics (Society of the Plastics Industry)

PETE: polyethylene terephthalate
HDPE: high-density polyethylene
V: vinyl / polyvinyl chloride
LDPE: low-density polyethylene
PP: polypropylene
PS: polystyrene
OTHER: other



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- Polypropylene (PP), Polyethylene (PE): corrugated or fluted sheets (“Coroplast”, “Corex”)
- Polyester, Polyethylene terephthalate (PET) (“Mylar” / “Melinex”)
- Polyethylene terephthalate glycol (PETG) sheet (“Vivak”)
- Polystyrene (PS) and modified PS such as high-impact polystyrene (HIPS). Often found as small containers
- Acrylic (MMA or PMMA) (e.g. “Plexiglass” / “Perspex,” “Acrylite”)
- Acrylonitrile/butadiene/styrene (ABS) (sheet plastic)
- Polycarbonate (PC): thick sheets (“Lexan,” “Tuffak”)
- Polytetrafluoroethylene (PTFE) (Teflon)
- Low-density polyethylene (LDPE), for short-term uses (5-10 years, after which it becomes yellow and brittle – but will not stain objects): sheeting, bags, envelopes.
- High quality and well characterized polyurethane

Foams

Issues

- Some foams may release harmful vapours, degrade and become sticky with time.



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- Using polyurethane foams for prolonged contact with objects, since they release harmful airborne pollutants that can stain by contact and can become sticky with time
- PVC foam
- Silicone foam
- Neoprene foam (possibly contains chlorides)



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- Polyurethane foams, but only for short-term contact with objects (e.g. cushioning material in a packing case), preferably with objects pre-wrapped in polyethylene sheeting or another interface material. Choose the uncoloured (whitish) or black kind. To make them last longer, store the foams in dark plastic bags.
- Polyethylene foam, either closed or open cell (“Ethafoam”/“Plastazote”)
- Polypropylene foam (“Microfoam”)
- Cross-linked polyethylene foam (“Nalgene”, “Volara”)



Other external resources

[Discussion about the use of foams in conservation](#)

[CAMEO](#): Conservation & Art Material Encyclopedia Online

[Préserv'Art](#): Base de données interactive de produits et d'équipements utilisés pour la conservation



Resource 5 - 50% rule options

This table gives you an idea of the options you may have, depending on your floor space occupation by units.

	Floor space occupation by units is <u>over</u> 50% <i>cheaper options may be more limited</i>	Floor space occupation by units is <u>under</u> 50% <i>several cheaper options are available</i>
Low-cost options	Remove non-collections items from storage	Remove non-collections items from storage
	Fill empty shelves and cabinets (but still max. 2 objects handled to retrieve another)	Fill empty shelves and cabinets (but still max. 2 objects handled to retrieve another)
	Regroup objects of similar sizes on the same shelves and adjust shelf height accordingly	Regroup objects of similar sizes on the same shelves and adjust shelf height accordingly
	Increase number of shelves and reduce the distance between shelves	Increase number of shelves and reduce the distance between shelves
	Use space above the existing storage units	Use space above the existing storage units
	Find an inventive way to store specific collections	Find an inventive way to store specific collections
	Use walls or ends of aisles to hang 2D collections	Use walls or ends of aisles to hang 2D collections
	Evaluate if it is possible to de-accession and dispose of collections	Evaluate if it is possible to de-accession and dispose of collections
	Relocate one of the collections elsewhere	Relocate one of the collections elsewhere
	Transfer the whole collection to a larger room	Use up to 50% of the floor space with unused or unassembled shelves you find in hallways or other locations throughout the building
	Use up to 50% of the floor space with abandoned storage units you find in hallways, supply rooms, offices, etc.	
Higher-cost options	Replace fixed units with rolling compact shelving	Buy or build new furniture
	Find offsite storage space	



Resource 6 - Maximum floor space occupation by unit type

This guideline shows the maximum floor space occupation for different types of units and retrieval requirements. Use this resource to determine the floor space occupation by units.

	Unit type	Requirements for object retrieval	Maximum floor space occupation of unit type
FIXED	 Pallets	 Machinery (hand pallet truck / forklift)	25%
	 Cabinets	 2 people	35%
		 1 person	45%
	 Open shelves	 2 people	35%
		 1 person	45%
	 Drawers	 horizontal access	60%
MOBILE	 Sliding racks	 vertical access	66%
	 High-density storage	 2 people	70%
		 1 person	80%



Resource 7 - Location spot-check exercise

You may be surprised by what you find... or don't find.

For you, what is a reasonable timeframe to physically locate an object in storage? _____ minutes

i For a small collection (max. 10,000 objects) with a healthy documentation system, we believe it should be possible to physically locate objects in storage, using the documentation system in 3 minutes or less. If your collection is much larger, or you have several collection storage rooms, it may take you more than 3 minutes. The important thing is that you define how long it should take for your museum. In the future, you can use this benchmark to verify if your documentation system is still healthy after you have reorganized your storage room.

A - Starting from the documentation system, identify 24 objects at random (write the accession numbers in the table below).

B – Write down where the objects are supposed to be according to the documentation system.

C – Use a smart phone or watch to calculate how much time it takes you to retrieve each object.

D – Note any observations as to why it was difficult or easy to find the objects.

A Object	B Location in storage	C Time	D Observations
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			
17.			

18.			
19.			
20.			
21.			
22.			
23.			
24.			

1. How many objects were physically located in more time than your specified timeframe?

2. Divide this number by your sample size (24, in this case): _____

3. Multiply x 100: _____ %

Conclusion:

According to this exercise, on average, _____%* of the time, it will take you more than _____(your ideal timeframe)_____ minutes to locate an object in your storage room.

*With this sample size, the confidence level is 95% (degree of reliability) and the confidence interval is 20% (margin of error of your final percentage). To reduce confidence interval to 10%, you need a sample of about 100 objects – regardless of the size of your collection.



Online resources (external link)

To play with different confidence levels and intervals based on the size of your collection, try a [sample size calculator](#)



Resource 8 - Main collection vulnerabilities

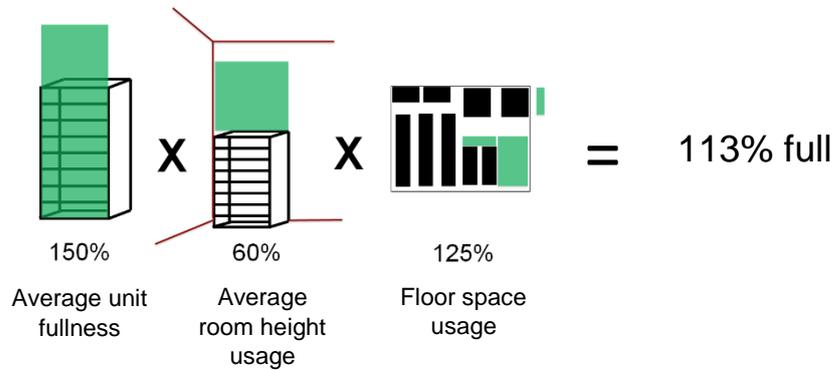
Use this table to identify objects in your collection that may be highly vulnerable to ongoing deterioration.

Objects most vulnerable to incorrect RH, incorrect temperature, pests, and fading	Notes
Organic materials with a surface rich in soluble protein, starch or sugar kept at 75% RH or above (e.g. leather, skin, parchment, starched, sized or dirty textiles and paper)	Above 75% RH, mould starts to develop increasingly fast as the RH goes up: <ul style="list-style-type: none"> ▶ 100 days at 70% RH ▶ 10 days at 80% RH ▶ 2 days at 90-100% RH More information: Agents of deterioration: Incorrect relative humidity (external link).
Magnetic media (tapes of video, audio, data; floppy discs)	Even at room temperature and moderate relative humidity (20°C at 50% RH), these types of materials will only last about 30 years. More information: Agents of deterioration: Incorrect temperature (external link). Cool and dry conditions are preferable.
Photographic prints: either colour or poorly processed	
Cellulose nitrate objects	
Objects made from elastic polymers (from rubber to polyurethane foams)	
Newsprint and low-quality books, papers post-1850	Even at room temperature and moderate relative humidity (20°C at 50% RH), these types of materials will only last about 50 years. More information: Agents of deterioration: Incorrect temperature (external link). Cool and dry conditions are preferable.
Acetate film	
Celluloid and many early plastics	
Natural materials acidified by pollution (textiles, leather)	
Recently acquired objects that were previously kept in environments that were more tightly controlled than yours, particularly layered structures (painted surfaces of any kind), furniture or other restrained wood assemblies, taut skins	If these objects have been kept in a tightly controlled environment in the past, and are now being introduced in a more “relaxed” environment, they are at higher risk of mechanical damage (fractures, warping, cracks, flaking).
Recently restored objects	Objects that were recently restored may be weaker in the areas where the repairs were carried out. Introducing them to environments where conditions are uncontrolled exposes them to a higher risk of mechanical damage.
Objects at high risk of pest infestation: animal-derived materials (furs, skins, leather, textiles, hairs, feathers) or natural history specimens (except minerals)	These are the most vulnerable types of objects. Special preventive measures for pests may be required.
Objects with coloured dyes that are continuously being exposed to light and UV	If light is excluded from storage, this is not an issue.

Resource 9 - Guesstimate storage fullness

For some projects, it may be useful to guesstimate the overall fullness of your storage room to quantify the degree of overcrowding. This can be useful to report and may help to support some of your recommendations.

Overall storage fullness can be calculated by looking at 3 factors, which are then multiplied:



Storage fullness is a measure of overcrowding. In the example shown above, the storage room would be 13% overcrowded (or 13% too full).

1st FACTOR: Average unit fullness

 You have already done this in step 3 (Phase 2), see the value you wrote in box “k” (total unit fullness) at the bottom of  **Worksheet 4**.

2nd FACTOR: Average room height usage

This is a measure of how well you are using the available vertical space in your storage room.

Here, we are only interested in “clear height” (i.e. the *usable* vertical space), so building systems (lighting fixtures, air ducts, water sprinklers), or other obstacles do not count as part of the *usable* space. In the image to the right, 100% of the vertical space is being used since the air duct and support beam would make it impossible to extend the units upwards. The fire code or building code in your area may dictate how much clearance is required below fixtures or mechanical systems.

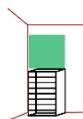
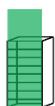


Clear height, or usable vertical space, is not always the same as the room height because of various obstructions (in this case, ventilation ducts) © ICCROM

Examine each room as a whole and make a quick visual estimate of the percentage of **usable** room height that is currently being used. You can do this more systematically by assessing each unit individually and then calculating the average for each room, or... you can do a quick visual estimation for the entire room.

3rd FACTOR: Floor space usage

 You may have already done this in Phase 2, step 4. If not, go and do it. Afterwards, all you have to do is multiply all 3 values:



A Storage room name	U Average unit fullness (%) <i>Retrieve from Worksheet 4</i>	R Average room height usage (%)	F Floor space usage (%) <i>Retrieve from Phase 2, step 4</i>	S Fullness of storage (%) <i>$U \times R \times F$</i>



Other external resources

There are a few published methods to help you estimate storage space. Some are specific to certain object types, some have been critiqued or reviewed by others. Who knows, you may get some useful ideas by reading some of these!

Published methods

Chapman, V. 1998. [Guesstimating storage space](#) (external link). *Natural Sciences Conservation Group Newsletter* 9: 34–42.

Maximea, H. 2012. Planning for collection storage. In *Manual of Museum Planning: Sustainable space, facilities, and operations*, eds. B. Lord, G. Dexter Lord, and L. Martin, 250–284. Lanham: AltaMiraPress.

National Parks Service. 1997. [Determining museum storage space requirements. Conserve O Gram 4/11](#) (external link). Washington D.C.

Païn, S. 2010. Un outil d'optimisation du rangement de collections conditionnées en caisses standardisées : le taux de compacité [Storage density : a tool used to optimize collections stored in standard-sized boxes]. *CRBC* 28: 53–61.

Walston, S. and B. Bertram. 1992. Estimating space for the storage of ethnographic collections. In *La conservation préventive*, 137–144. Paris: ARAAFU.

Reviews of published space estimation methods

Lambert, S. and T. Mottus. 2014. Museum storage space estimations: In theory and practice. In *ICOM-CC 17th Triennial Conference Preprints, Melbourne, 15–19 September 2014*, ed. J. Bridgland, art. 1503, 9 pp. Paris: International Council of Museums.

Païn, S. 2009. La «méthode Walston» : Comment ça marche, pourquoi ça marche... Et pourquoi parfois ça ne marche pas! [The 'Walston' method: how it works, why it works... and why sometimes it doesn't work!]. *CRBC* 27: 55–61.



Resource 10 - The 12 object categories

These guidelines can be used to find solutions for “outliers”:

- the “objects with special requirements” that you identified in Phase 2 ( **Worksheet 6**), i.e. heavy, voluminous, long or awkwardly shaped objects;
- objects on the floor;
- groups of objects that do not have a definitive storage solution yet (e.g. recent acquisitions, other unprocessed objects).

The following are 12 suggested categories of objects:

- 1 - Extra heavy or voluminous objects, difficult to manipulate
- 2 - Extra-long objects, not self-supporting (over 2 m / 6 ft)
- 3 - Very heavy objects, self-supporting, requiring 2 people to manipulate (over 30 kg / 70 lbs)
- 4 - Long objects, not self-supporting (under 2 m / 7 ft)
- 5 - Heavy objects, self-supporting, can be carried by one person using equipment (10-30 kg / 20-70 lbs)
- 6 - Light self-supporting objects that can be carried by one person, with two hands (0.5-10 kg / 1-20 lbs)
- 7 - Small objects that can be held in one hand
- 8 - “Three-dimensional” textiles
- 9 - Objects that should be stored flat
- 10 - Objects that can be rolled
- 11 - Small two-dimensional objects (under 50 cm / 1.5 ft)
- 12 - Large two-dimensional objects (over 50 cm / 1.5 ft)

These categories are loosely based on object size and weight, which is an indication of how they may be manoeuvred (by one person, by two or more people, with special equipment). Feel free to adapt or apply other solutions as you see fit and keep in mind the following:

- Objects in categories 1-3 are typically found on the floor without a definitive location in storage. This is often because they are cumbersome and require a solution that is not standard. It is important to **deal with these objects first**, because the solution you choose will have a direct impact on the availability of floor space for the more common sized objects. This in turn may affect how you design your storage layout (i.e. where you locate units to maximize space).
- Objects in category 4 are often found on standard metal shelving, but there are perhaps other, more space efficient ways, to deal with them.

For more storage ideas, consult

- [Collection Storage Tips & Tricks \(RE-ORG\)](#) (external link)
- [STASH \(Storage Techniques for Art, Science and History\)](#) (external link)

1. Extra heavy or voluminous objects, difficult to manipulate

Particularly voluminous or heavy objects (e.g. over 50 kg / 100 lbs), objects with an awkward shape, or objects that require specialized equipment for retrieval.

Examples: Stone sarcophagi, agricultural implements, architectural elements, vehicles, contemporary art installations, large basketry, etc.

Some possible storage solutions:



Pallets on the floor if there are only a few objects of this type
© ICCROM



Pallets on industrial shelving if there are enough objects of this type to justify it © ICCROM



Hung on ceiling joists or anchors © ICCROM

STORAGE TIPS

- Extra heavy or voluminous objects require special health and safety considerations. Consult health and safety officials to make sure your solutions are safe – not only for objects, but for your staff as well.
- Used pallets can often be found through your local classified ads, at your nearest building yard or industrial area. Make sure they are pest free before introducing them into the museum. They can also be custom made, as described in [Make your own pallet!](#) (external link).
- Place **pallets on the floor** close to the door if you plan to move these objects frequently; this will make circulation easier. Objects that are susceptible to toppling may need to be fastened to the pallet.
- For **pallets on industrial shelving**, try to place heavier objects at the bottom to prevent toppling and / or accidents during retrieval; also try to place less frequently accessed objects towards the top. Building codes in your area may have specific anti-seismic requirements for this type of shelving (anchoring, bracing, etc.) so confirm what would be appropriate for your location.
- Before **hanging** any object from ceiling joists or anchors, consult a structural engineer to confirm that this can be done safely.

SPACE PLANNING TIPS

- To estimate the floor space requirement for **pallets on the floor**, add up the area occupied by the amount of pallets you need. Typically, you will need one pallet per object. However, if the objects are much smaller than the size of your pallets, consider storing more than one object on the same pallet if this can be done safely.
- For **pallets on industrial shelving**, be aware that the type of forklift used to retrieve the pallets will affect the required aisle width. As a general rule, the higher the forklift can reach, the wider the aisles must be. An online search for the terms “warehouse aisle width” will provide useful information.
- For **pallets on industrial shelving**, group objects according to their height in order to maximize the usage of vertical space between shelves – storing short objects next to tall objects wastes space so avoid this. Remember to leave sufficient clearance above the objects for safe retrieval. Select shelving that will support the weight of the objects and that are deep enough to allow you to retrieve a pallet without having to move more than two other pallets (preferably less). If you wish, to plan the pallet layout on the shelving, use graph paper to draw the *top view* – showing the shelf footprint; and *side view* – showing the shelf height usage. Another method is to add the total area covered by your pallets and divide this number by the area of one shelf. This will determine how many shelves you need. Also, experiment with shelf heights by grouping objects of the same size together.

2. Extra-long objects, not self-supporting (over 2 m / 6 ft)

Particularly long or high objects that are not stable when placed on their base.

Examples: Totem poles, canoes, statues, architectural elements, etc.

Some possible storage solutions:



Fixed racks © ICCROM



Cantilever shelving

Image courtesy of Peterborough Museum and Archives, Canada



Industrial shelving © ICCROM

STORAGE TIPS

- If an object is too heavy to be suspended on a rack, it can be placed on a pallet or on a piece of foam to elevate it off the floor. This can be done before it is secured to a rack.
- Learn how to create [art storage screens for paintings](#) (external link).

SPACE PLANNING TIPS

- For **fixed racks**, **cantilever shelving** and **industrial shelving**, the preferred strategy is to group objects of similar heights or lengths to maximize the usage of vertical space on racks or shelving. As a starting point, try grouping objects into small and large categories, then you may determine if a medium category is also needed. On a shelf, the goal is to avoid having tall objects next to short objects. On racks, the goal is to have enough space above shorter objects to hang other ones.
- Plan your **fixed rack** layout using graph paper:
 - The height of the racks will depend on the height of the tallest object, but for these types of objects, it could be possible to save on materials by stopping the rack halfway up the wall and securing only the middle portion of objects.
 - The length of the racks will depend on the combined widths of the objects to be stored, plus additional space on both sides for safe retrieval.
- For **cantilever shelving** and **industrial shelving**, select units that will support the weight of the objects and provide sufficient depth for retrieving objects without having to move more than two other objects (preferably less). If you wish to plan the object layout on the shelving, use graph paper to draw the *top view* – showing the shelf footprint; and *side view* – showing the shelf height usage. Another method is to add up the total area covered by your objects and divide this number by the area of one shelf to determine how many shelves you will need.

3. Very heavy objects, self-supporting, requiring 2 people to manipulate (over 30 kg / 70 lbs)

Objects that are difficult to handle because of their weight, but can be transported by two people.

Examples: Statues, furniture, safe, sewing machines, etc.

Some possible storage solutions:



Pallets on the floor © ICCROM



Wheeled platforms or dollies
© ICCROM



Industrial shelving © ICCROM

STORAGE TIPS

- **Wheeled platforms or dollies** are easy and inexpensive to make. All you need is plywood and casters (wheels), which can be purchased at your local hardware store. Lockable casters are a nice feature to prevent your objects from rolling away; alternatively, wood blocks could be used to wedge the wheels in place.
- Place **pallets on the floor** close to the door if you plan to move the objects frequently; this will make circulation easier.
- For objects **on industrial shelving**, try to place heavier objects at the bottom to prevent toppling and / or accidents during retrieval; also try to place less frequently accessed objects towards the top. Building codes in your area may have specific anti-seismic requirements for this type of shelving (anchoring, bracing, etc.) so confirm what would be appropriate for your location.

SPACE PLANNING TIPS

- To estimate the floor space requirement for **pallets on the floor**, add up the area occupied by the amount of pallets you need. Typically, one pallet per object is required. However, if the objects are much smaller than the size of your pallets, consider storing more than one object on the same pallet if this can be done safely.
- Group objects on **industrial shelving** according to their height in order to maximize the usage of vertical space between shelves. Leave sufficient clearance above the objects for safe retrieval. Select shelving that will support the weight of the objects and provide sufficient depth for retrieving a pallet without having to move more than two other ones (preferably less). If you wish, plan the object layout on the shelving by using graph paper to draw the *top view* – showing the shelf footprint; and *side view* – showing the shelf height usage. Another method is to add up the total area covered by your pallets and divide this number by the area of one shelf to determine how many shelves you will need, and experiment with shelf heights by grouping objects of the same size together.

4. Long objects, not self-supporting (under 2 m / 7 ft)

Long and thin objects that would otherwise waste a lot of vertical space if they were stored on shelves.

Examples: Firearms, swords, sceptres, arrows, spears, oars, agricultural tools

Some possible storage solutions:



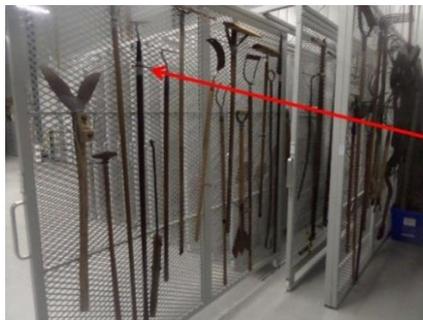
Fixed racks with a tying or support mechanism © ICCROM



Shelving unit with storage mounts © ICCROM



Modified shelving unit
© ICCROM



Sliding racks with objects secured using small bungee cords
Image courtesy of Strathroy Museum, Canada

STORAGE TIPS

- As an alternative to wire mesh racks, you can use two vertical rods (wood or metal) firmly fixed to the wall.
- To find out how to make wooden racks for long and thin objects, see the guidance note [Support no.1 for objects with shafts](#) (external link). You can also make a [mobile support system for objects with shafts](#) (external link).
- Learn about [storage techniques for canoe paddles and other long-handled tools](#) (external link).
- Learn how to create [art storage screens for paintings](#) (external link).

SPACE PLANNING TIPS

- For **racks**, the preferred strategy is to group objects of similar heights or lengths to maximize the usage of vertical space. As a starting point, try grouping objects into small and large categories, then you may determine if a medium category is also needed. The goal is to have enough space above short objects to hang other objects.
- If your objects are relatively easy to manipulate, you can estimate the amount of rack space required by laying the objects flat on a sheet of plastic. Another method is to plan your **rack** layout using graph paper and keeping the following in mind:
 - The height of the racks will depend on the combined widths of the objects to be stored, plus additional space above and below for safe retrieval.
 - The width of the racks will depend on the length of the longest object. For wire mesh racks, you can save on materials by stopping the rack halfway up the wall and securing the object in two locations towards the centre, or by using the vertical bar system.
- To maximize space efficiency, group objects on **modified shelving units** according to their size.

5. Heavy objects, self-supporting, can be carried by one person using equipment (about 10 to 30 kg / 20 to 70 lbs)

Objects that are heavier, but that one person would be able to carry without too much difficulty.

Examples: Busts, statues, smaller furniture, electronic equipment, larger bound volumes, small metal/stone/wood carvings, etc.

Some possible storage solutions:



Shelving units with adaptable shelves © ICCROM



Shelving units without adaptable shelves © ICCROM

STORAGE TIPS

- For objects **on shelving units**, try to place heavier objects at the bottom to prevent toppling and/or accidents during retrieval; also try to place less frequently accessed objects towards the top.

SPACE PLANNING TIPS

- If the shelves in the **shelving units** are not deep enough to accommodate larger objects, you can join two **shelving units** (i.e. back-to-back) to increase the available storage surface.
- Group objects on **shelving units** according to their size in order to maximize space efficiency. If you wish, plan the object layout on the shelving using graph paper to draw the *top view* – showing the shelf footprint; and *side view* – showing the shelf height usage. Another method is to add up the total area covered by your objects (adding sufficient space around the objects to allow safe handling and retrieval). Divide this number by the area of one shelf to determine how many shelves you will need, and experiment with shelf heights by grouping objects of the same size together.
- When objects are taller than they are long, you can maximize space by placing them flat on a shelf if this can be done safely. If needed, you can stabilize them with foam blocks.

6. Light self-supporting objects that can be carried by one person, with two hands (about 0.5 to 10 kg / 1 to 20 lbs)

Objects that can be manoeuvred easily by one person.

Examples: Ceramics, sculptures, tools, shoes, hats, basketry, masks, firearms, etc.

Some possible storage solutions:



Cupboards. Objects are not visible, but are protected against dust and can be locked away if they are valuable, dangerous or hazardous. © ICCROM



Fixed racks. Objects are visible, but are not protected against dust. © ICCROM



Hung on chains. Objects are visible, but are not protected against dust. © ICCROM

STORAGE TIPS

- When placing objects one in front of the other in a **cupboard** or in a **shelving unit**, place the tallest objects at the back and the shortest at the front to ensure objects are accessible and visible. Try to place heavier objects towards the bottom of the unit to prevent toppling and accidents during retrieval; also try to place less frequently accessed objects towards the top. If needed, purchase a step ladder high enough to reach the top shelf safely.

SPACE PLANNING TIPS

- Group objects in a **cupboard** or in a **shelving unit** according to their size in order to maximize space efficiency. If you wish, plan the object layout on the shelving by using graph paper to draw the *top view* – showing the shelf footprint; and *side view* – showing the shelf height usage. Another method is to add up the total area covered by your objects (adding sufficient space around the objects to allow safe handling and retrieval). Divide this number by the area of one shelf to determine how many shelves you will need, and experiment with shelf heights by grouping objects of the same size together.
- If your objects are relatively easy to manoeuvre, you can estimate the amount of **rack** space required by laying the objects flat on a sheet of plastic. Another method is to plan your **rack** layout using graph paper and keeping the following in mind:
 - The height of the racks will depend on the combined widths of the objects to be stored, plus additional space above and below for safe retrieval.
 - The width of the racks will depend on the length of the longest object. For wire mesh racks, you can save on materials by stopping the rack halfway up the wall and securing the object in two locations towards the centre, or by using the vertical bar system.

7. Small objects that can be held in one hand

Objects less than 10 cm / 4 in in height, but that can easily be misplaced or lost because of their size.

Examples: Jewellery, necklaces, rings, cylinder seals, cuneiform tablets, miniatures on ivory, small boxes, archaeological fragments, coins, silverware, etc.

Some possible storage solutions:



Boxes with compartments on shelving units provide added protection of fragile objects © ICCROM



Drawer cabinets maximize the use of vertical space and provide good visibility of the objects © ICCROM



Safes may be needed for the most precious items © ICCROM



Sliding plywood boards on shelving can be used to replace a drawer, to maintain access to objects in the back © ICCROM



Chemically stable plastic folders placed in **filing cabinets** © ICCROM

STORAGE TIPS

- Because these objects are easily misplaced, they are frequently found in boxes or containers that can fit in a storage unit.
- In theory, **drawer cabinets** can be stacked however stacking them too high can make retrieval more difficult, and may not be safe for staff.
- When putting objects in direct contact with plywood, make sure that these are not “acid-sensitive” objects (see  **Resource 4 - Products and materials for storage**); otherwise, you may need to create a barrier between the object and the plywood to prevent direct contact (e.g. latex paint, polyethylene foam sheets).

SPACE PLANNING TIPS

- To determine how many **filing cabinets** you need (C), first determine the capacity (i.e. how many objects can fit) of one filing cabinet (A) by multiplying the number of objects that fit in one folder by the amount of folders that fit in one drawer, and by the number of drawers in one cabinet. Then divide the total number of objects you have to store (B) by the filing cabinet capacity (A). Therefore:
 $C = B / A$
- Group **boxes** on **shelving units** according to their height in order to maximize space efficiency. If you wish, plan the object layout on the shelving using graph paper to draw the *top view* – showing the shelf footprint; and *side view* – showing the shelf height usage. Another method is to add up the total area covered by all your boxes (adding sufficient space around the objects to allow safe handling and retrieval), divide this number by the area of one shelf to determine how many shelves you will need, and experiment with shelf heights by grouping boxes of the same size together. You may also stack them, provided they remain accessible and handling is safe for staff.
- Group the objects into the **drawer cabinet** according to their size in order to maximize space efficiency. If you wish, calculate how many objects can fit in the drawer by using graph paper to draw the *top view* – showing the drawer footprint. Another method is to add up the total area covered by your objects (adding sufficient space around the objects to allow safe handling and retrieval). Then divide this number by the area of one object to determine how many drawer cabinets you will need.
- Group objects on **plywood boards on shelving** according to their size in order to maximize space efficiency. If you wish to plan the object layout on the shelving, use graph paper to draw the *top view* – showing the shelf footprint; and *side view* – showing the shelf height usage within the unit. Another method is to add up the total area covered by your objects (adding sufficient space around the objects to allow safe handling and retrieval), divide this number by the area of one board to determine how many boards and shelves you will need, and experiment with shelf heights by grouping objects of the same size together.

8. “Three dimensional” textiles

Costumes, puppets or other types of flexible objects that must be hung.

Some possible storage solutions:



Cupboards. Objects are protected from dust and light.
© ICCROM



Ceiling- or wall-mounted rods
© ICCROM



Individual stands
© ICCROM

STORAGE TIPS

- “Three dimensional” textiles stored in cupboards should only be one row deep to make retrieval easier.
- For tips on how to make your own padded hangers for clothing, see [padded hangers for garment systems no. 1](#) (external link) or [storage techniques for hanging garments: padded hangers](#) (external link).
- For tips on how to make dust covers, see [storage techniques for hanging garments: dust covers](#) (external link).
- Standard triangular hangers may not be suitable for certain costumes, such as ponchos or kimonos. For tips on how to build straight- and triangular-shouldered hangers, see [padded hangers for garment systems no. 2](#) (external link).
- Learn more about [hanging storage for costumes](#) (external link).

SPACE PLANNING TIPS

- In order to maximize the room height usage, you could hang clothing over other storage units (e.g. drawer cabinets), or use a double height of **wall-mounted rods** (i.e. one rod below and one rod above).
- When storing costumes on padded hangers, group the costumes by length; depending on their size and on your storage layout, you may be able to store other objects above or below them. The length of hanging rod you require will vary depending on the padded hanger type and the width of your costumes (generally 10-20 cm / 6 in to 1 ft). You can evaluate how many costumes can fit on one rod using graph paper to draw the *top view* – showing the required depth; and *side view* – showing the height usage and rod length. Another method is to add up the total width of the costumes (adding sufficient space around the objects to allow safe handling and retrieval) to determine what rod length you need.

9. Objects that should be stored flat

Flat objects that you cannot stored rolled because of their fragility or their composition (e.g. powdery media, rigid or brittle supports).

Examples: Heavily embroidered or fragile textiles, unframed drawings, prints or photography, metal plates, etc.

Some possible storage solutions:



Sliding plywood boards on shelving are simple and cheap for storing objects flat © ICCROM



Metal drawer cabinets provide protection against dust but are more expensive © ICCROM



Folders are an effective way to group drawings and prints to minimize handling © ICCROM

STORAGE TIPS

- You can store several items in the same folder if they are interleaved (e.g. using a sheet of acid-free paper for prints or a piece of linen or cotton for textiles). You can group several **folders** in a single drawer, but keep in mind that you should ideally only handle two to retrieve another.
- Writing the accession numbers on each **folder** (in the same location) will make retrieval possible without having to open each folder and manipulate the objects to find the right one.
- When putting objects in direct contact with plywood, make sure that these are not “acid-sensitive” objects (see  **Resource 4 - Products and materials for storage**); otherwise, you may need to create a barrier between the object and the plywood to prevent direct contact (e.g. latex paint, polyethylene foam sheets). Similarly, some papers and photographs are particularly sensitive to acids, which may require you to use acid-free storage materials.
- Learn more about [flat storage for textiles](#) (external link).

SPACE PLANNING TIPS

- Group the objects into **drawer cabinets** according to their size (or **folder** size) in order to maximize space efficiency.
- If you plan to use folders, you can calculate the number of folders needed (C) by dividing the total number of objects (A) by the number of objects you will put in one folder (B) while allowing enough space for easy access. Therefore: **$C = A / B$**
Then, to calculate the number of drawers required (Z), divide the number of folders needed (C) by the number of folders you can safely store in one drawer (Y). Therefore: **$Z = C / Y$**
- Group objects on **plywood boards on shelving** according to their size in order to maximize space efficiency. If you wish to plan the object layout on the boards, use graph paper to draw the *top view* – showing the shelf footprint; and *side view* – showing the shelf height usage within the unit. Another method is to add up the total area covered by your objects (adding sufficient space around the objects to allow safe handling and retrieval), divide this number by the area of one board to determine how many boards and shelves you will need, and experiment with shelf heights by grouping objects of the same size together.

10. Objects that can be rolled

Objects that are not susceptible to damage when they are rolled.

Examples: Carpets, architectural plans, tapestries, painted canvases, thangkas, etc.

Some possible storage solutions:



Drawer cabinets for rolled smaller objects (e.g. under 70 cm / 2 ft) © ICCROM



Shelving units fitted with tube compartments © ICCROM



Modified shelving units fitted with horizontal bars to support tubes © ICCROM

STORAGE TIPS

- Writing the object accession number and hanging it on the tube along with an image of the object will make identification easier without having to unroll the objects.
- Learn more about [rolled storage for textiles](#) (external link).

SPACE PLANNING TIPS

- Group objects in **drawer cabinets** according to their size in order to maximize space efficiency. The goal is to combine objects of different sizes – if possible – in order to maximize the use of space in each drawer. If you wish to plan the object layout, using graph paper to draw the *top view* – showing the object layout in each drawer; and *side view* – showing the height usage. Another method is to add up the total area covered by your rolled objects (adding sufficient space around the objects to allow safe handling and retrieval). Then divide this number by the area of one drawer to determine how many drawers you will need.
- For the **modified shelving units**, group objects according to their length in order to maximize space efficiency. You may group smaller objects on the same rod. Leave sufficient clearance above each “rod level” for safe retrieval. Ensure that the shelving can withstand the weight of the objects and rods, and select rods that are strong enough to support the weight of the textiles over time. The rod levels can be fully horizontal, or slightly on a diagonal to make it easier to access the rods in the back. If you wish to plan the rod layout, use graph paper to draw the *top view* – showing the shelf footprint; and *side view* – showing the shelf height usage. Another method is to estimate how many rods you will need, and of what length, by grouping your textiles into size categories (small, medium, large) and determining how many textiles to store in each size category. Your size categories will be determined by the different lengths of rods that can be accommodated by your storage units. This, in turn, will depend on the width of your storage units and the degree to which these units can be safely modified.

11. Small framed objects (under 50 cm / 1.5 ft)

Examples: Paintings, prints and other framed objects, wood carvings.

Some possible storage solutions:



Wall racks take up a lot of space (but typically wall space is underutilized); all objects are fully visible © ICCROM



Compartmentalized units, typically made of plywood, with or without wheels. Can be more space efficient than rack storage, but can expose vulnerable and frequently accessed objects to more handling risks. © ICCROM



Shelving can be more space efficient than rack storage, but can expose vulnerable and frequently accessed objects to more handling risks © ICCROM

STORAGE TIPS

- **Compartmentalized units** are relatively easy and cheap to make. Adding wheels will transform them into mobile units (potential increased floor space occupation), but will also reduce the total weight they can hold.
- For **compartmentalized units** and **shelving**, writing the objects' accession number and possibly adding its picture on the side will make it easier to identify without needing to remove other objects.
- Frames can be damaged if you slide objects in and out of the **compartmentalized units**; it may be necessary to wrap them and pad the shelves to reduce this risk. Learn how to [wrap framed and unframed paintings](#) (external link). Separating these objects with rigid interleaves (e.g. fluted plastic sheets) could also prevent them from rubbing against each other. Keep your compartments narrow to avoid objects leaning on each other and creating too much pressure.
- Learn how to create [art storage screens for paintings](#) (external link).

SPACE PLANNING TIPS

- To maximize space in **compartmentalized units**, divide objects into size categories (small, medium, large) and design the compartments accordingly. The goal is to waste no vertical space inside individual compartments and to use the full room height by creating smaller compartments over larger ones. If you wish to plan the compartment layout, use graph paper to draw the *frontal view* – showing how vertical space is used. Another method is to add up the total area covered by your objects (i.e. the area of the object that is in contact with the shelf [frame depth by frame width]). Then divide this by the area of one shelf to determine how many shelves you will need, and experiment with shelf heights by grouping objects of the same size together.
- To determine how many compartments you need for each size category (C), first determine the capacity of a single compartment (A), i.e. how many objects you will store in a single compartment. For each size category, divide the total amount of objects by the compartment capacity (B). Therefore: **C = A / B**
- For **shelves**, you must group objects into size categories and adjust shelf heights to maximize space efficiency. If you wish to plan the object layout on the shelving, use graph paper to draw the *top view* – showing the shelf footprint; and *side view* – showing the shelf height usage. Another method is to add up the total area covered by your objects (the area of the object that is in contact with the shelf [frame depth by frame width]). Then divide this by the area of one shelf to determine how many shelves you will need, and experiment with shelf heights by grouping objects of the same size together.
- For storage on **wall racks**, the preferred strategy is to group objects of similar heights or lengths to maximize the usage of vertical space. As a starting point, try grouping objects into small and large categories, then you may determine if a medium category is also needed. The goal is to have enough space above short objects to hang other ones. If your objects are relatively easy to manoeuvre, you can also estimate the amount of rack space required by laying the objects on the floor over a sheet of plastic. Another method is to plan your **rack** layout using graph paper and keeping in mind:
 - The height of the racks will depend on the combined widths of the objects to be stored, plus additional space above and below for safe retrieval.
 - The width of the racks will depend on the combined lengths of the objects to be stored.

12. Large framed objects (over 50 cm / 1.5 ft.)

Examples: Paintings, prints and other framed objects, wood carvings.

Some possible storage solutions:



Wall racks take up a lot of space (but typically wall space is underutilized); all objects are fully visible
© ICCROM



Sliding racks take up less space; works are fully visible, but the cost is high © ICCROM



Compartmentalized units can be more space efficient than rack storage, but can expose vulnerable and frequently accessed objects to more handling risks
© ICCROM

STORAGE TIPS:

- **Compartmentalized units** are relatively easy and cheap to make. Adding wheels will transform them into mobile units (potential increased floor space occupation), but will also reduce their maximum weight capacity.
- For **compartmentalized units** writing the objects' accession number and possibly adding its picture on the side will make it easier to identify without needing to remove other objects.
- Frames can be damaged if you slide objects in and out of the **compartmentalized units**; it may be necessary to wrap them and pad the shelves to avoid this risk. Separating these objects with rigid interleaves (e.g.: fluted plastic sheets) could also prevent them from rubbing against each other. Keep your compartments narrow: you do not want your objects to create too much pressure on the others by leaning on them.
- Learn how to create [art storage screens for paintings](#) (external link).

SPACE PLANNING TIPS

- For storage on **racks**, the preferred strategy is to group objects of similar heights or lengths to maximize the usage of vertical space. As a starting point, try grouping objects into small and large categories, then you may determine if a medium category is also needed. The goal is to have enough space above short objects to hang other ones.
- If your objects are relatively easy to manoeuvre, you can estimate the amount of rack space required by laying the objects flat on a sheet of plastic. Another method is to plan your **rack** layout using graph paper and keeping in mind:
 - The height of the racks will depend on the combined height of the objects to be stored, plus additional space above and below for safe retrieval.
 - The width of the racks will depend on the combined lengths of the objects to be stored.
- To maximize space in **compartmentalized units**, divide objects into size categories (small, medium, large) and design the compartments accordingly. The goal is to waste no vertical space inside individual compartments and to use the full room height by creating smaller compartments over larger ones. If you wish to plan the compartment layout, use graph paper to draw the *frontal view* – showing how vertical space is used. Another method is to add up the total area covered by your objects (i.e. the area of the object that is in contact with the shelf [frame depth by frame width] – not what you typically consider to be the “surface of the object”). Then divide this number by the area of one shelf to determine how many shelves you will need, and experiment with shelf heights by grouping objects of the same size together.
- To determine how many compartments you need for each size category (C), first determine the capacity of a single compartment (A), i.e. how many objects you will store in a single compartment. For each size category, divide the total number of objects by the compartment capacity (B). Therefore: **C = A / B**



Resource 11 - Virtually reorganize your space using a visual approach

This method addresses the specific problem that arises when you regroup collections by size, adapt storage units to improve space efficiency, or when you discard units that are no longer adequate for the collection: how do you keep track of it all? This method allows you to do a virtual reorganization on paper. Those who are more computer savvy can save time and adapt this method using software. However, sometimes seeing everything on paper can help you understand the big picture better than on a computer screen. Those who feel comfortable using a purely intuitive method may also find useful tips that they could apply for some more challenging problems.

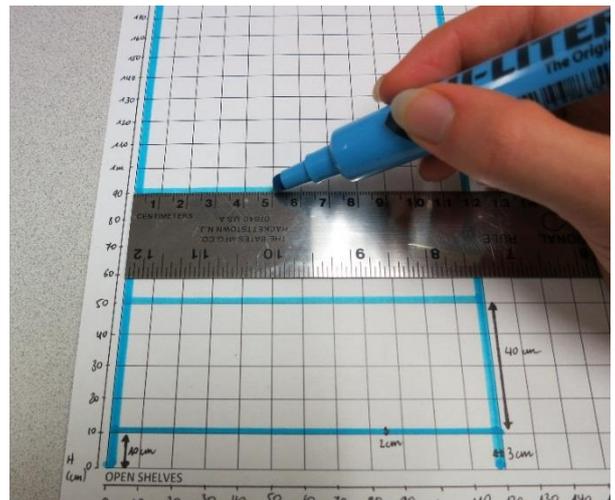
1. Map object groups within units

For this step, find a room where you can spread your supplies out, and where you can stick or pin sheets of paper to the walls. You may need repeated access to this space for a few days as you work through the solutions, so make sure this is possible.

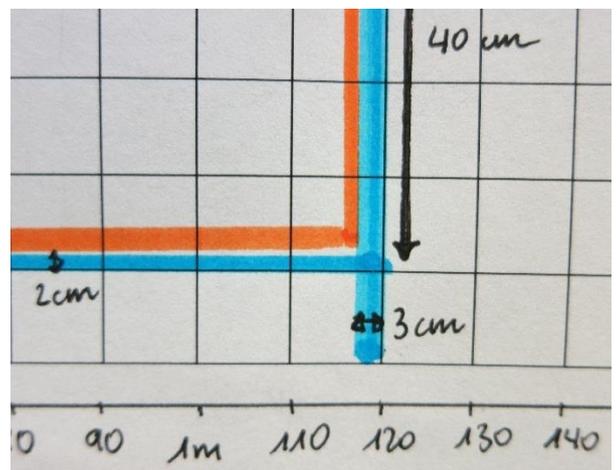
- Draw the outline of your storage units to scale on graph paper. Use one sheet per unit. Choose the most useful perspective (*bird's eye view* for drawers, *frontal view* for shelving units, etc.). We suggest that 1 square = 100 cm² (10 cm x 10 cm), or 16 in² (4 in x 4 in).
- Draw in the shelves. If the first shelf is 10 cm (4 in) off the ground, then begin drawing your line 1 square up.

 Don't forget to account for the thickness of the shelves because these will occupy space.

Make a few copies of the empty units. You may need to experiment with these, so it is useful to have a few blank copies.



Draw your units to scale using graph paper and add the shelves. © ICCROM

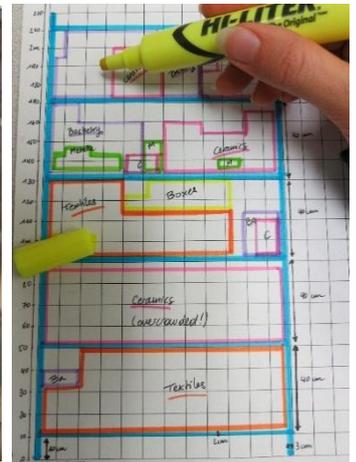


Remember to account for the thickness of the shelves in your drawings. © ICCROM

- c) Go into your storage room and draw the outline of the various object groupings. There is no need to record every single object; this is meant to be a simple visual method! Select your own colour coding and ensure it remains consistent throughout the exercise (e.g. always use yellow for ceramics, always use green for books). Round off your measurements to the next decimetre (e.g. 12 cm = 20 cm; 45 cm = 50 cm), or to the next multiple of 4 inches (10 in = 12 in; 3 in = 4 in). This is accurate enough for this method.



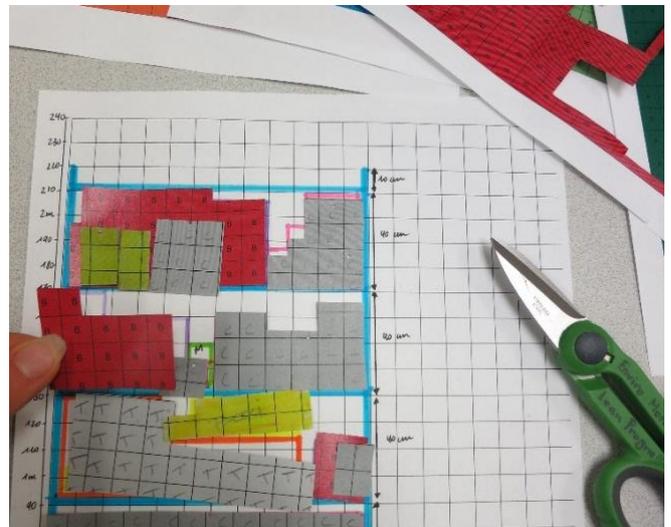
Cabinet in storage
© ICCROM



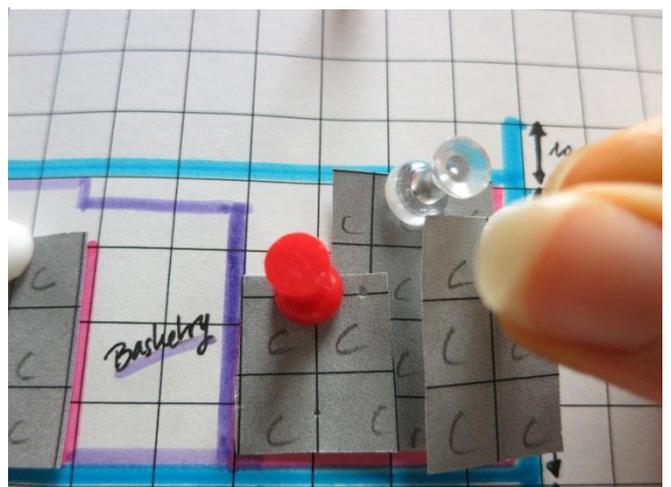
Corresponding sketch of the outline of object groups
© ICCROM

! If there are significant size differences within an object group (e.g. a taller ceramic vase behind a shorter one, or a large box in front of a smaller one), record this in your drawing by overlapping shape outlines. You will need this later when you overlap cut-outs to allow you to virtually reorganize your space.

- d) When you finish drawing the outlines of the object groups, cut the shapes. Pin your shapes in their current location on the unit drawing. Repeat for each unit in your storage room. Remember to use one sheet per unit. If within the same object group you have different object heights, just use the same colour and overlap them as you pin them on (see picture below).



Cut out the shapes to scale using coloured paper (respect the colour coding you established earlier). © ICCROM



In this example, there are three different sizes of ceramics: a taller group in the back, a smaller group on the left and a medium group on the right. We cut one shape for each group and pinned them on top of each other. © ICCROM

2. Reorganize the collection within units

Now that you have a mock-up of your storage units and the object groups within them, you can think about reorganization. As you move object groups from one unit to the other, be sure to provide enough space for safe handling (remember the 2 object rule). This is the right time to think about modifying or adapting your units based on your findings in **Worksheet 4**.

! Do not forget your objects with special requirements because the space they need will influence your storage reorganization (see **Resource 10 - The 12 object categories**).

- a) Use empty copies of your unit outlines to play with the shapes, regrouping them by size. This is how you will optimize space. You may also separate current groupings by cutting the shapes. For example, if all the books are currently stored together, but you prefer to separate them by size and split them up onto two shelves, then cut the shape in two and distribute.

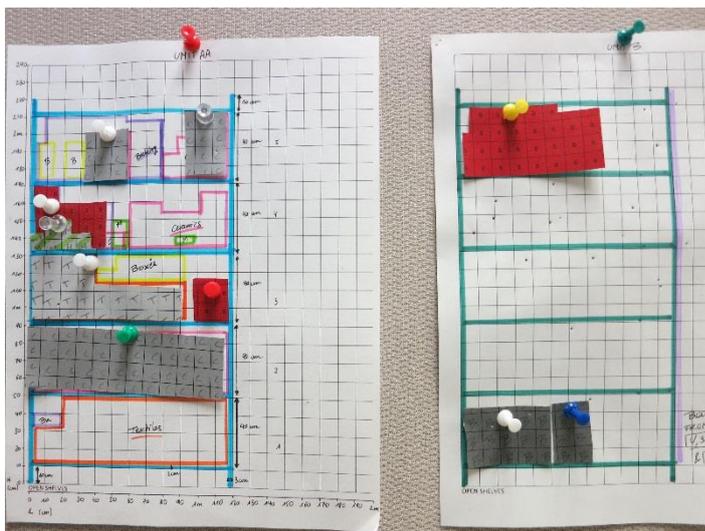
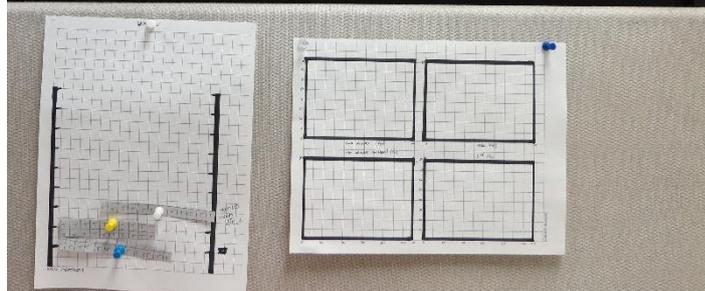
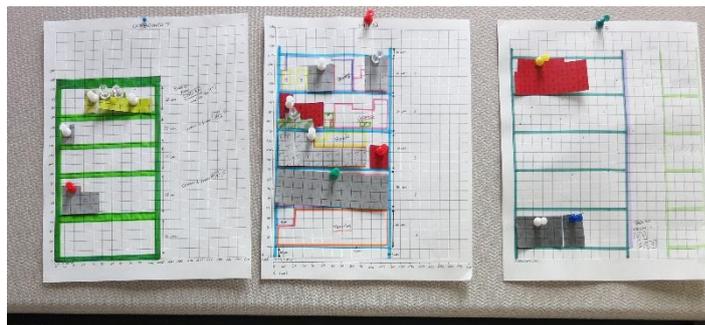
💡 Write the original location of the object groups in order to remember which unit you moved them from.

- b) When a storage unit is full, modify it or draw a new one if you cannot find any more space in the current units.

💡 This is when you can try to adapt your existing units, or try to design new ones to optimize space. For example, you can add or remove shelves in a unit, install additional shelving above an existing unit, add a wall rack, or create a special support for oddly shaped objects.

3. Make a list of your unit needs

When you are happy with your new storage layout, make a list of the units you need using **Worksheet 10**.



Pin the cut-out shapes onto fresh copies of the unit outlines, regrouping objects by size. © ICCROM



Resource 12 - Issue analysis

This method can be used to analyse some of the more complex issues you will tackle as part your storage reorganization. If you prefer, you could do an analysis for each of your issues. Think of it as a step-by-step process to make sure that you do not forget anything important.

1. Issue analysed

Retrieve this from the list of issues in your Storage Condition Report.

(C1) Feather objects are prone to dust accumulation

2. Risk of status quo

What could happen if this issue is ignored from the following three perspectives?

Risks to collection

- accumulation of dust on objects may attract humidity and cause micro-organisms to develop
- physical damage to objects resulting from the need to clean them more frequently
- colour change
- loss of interpretation potential

Risks to staff

- allergy risk
- staff refuse to continue working in the storage rooms

Risks to institution

- reduced visitor traffic
- loss of credibility
- loss of collection value

3. Proposed standard

*Briefly describe what it looks like once the issue is corrected. Make sure your standard is **precise** and **measurable** so you know if you have succeeded or not.*

Dust deposition is reduced as much as possible, so that no trace is left on shelves when objects are moved.

4. Actions required to achieve this standard

Focus on the most significant steps in the process, as if you were writing a procedure.

- Inspect collections to identify areas where dust is more prevalent
- Provide appropriate humidity control: avoid humidity above 75% year round using portable dehumidifiers
- Purchase cleaning equipment: vacuum cleaner equipped with HEPA filter, cotton gloves, soft bristle brushes
- Dust objects
- Re-house objects with tissue paper, polyester slip cover, conservation-grade boxes, adequate and adapted storage unit (stable materials, appropriate dimensions)

- Seal windows and doors
- Replace filters in ventilation system every 3 months
- Set up a periodic cleaning schedule
- Limit the ingress of people in storage (source of dust)

5. Other issues or risks that could arise if no. 3 and no. 4 are implemented

Sometimes, you address one issue and by doing so, may create others. This is the time to think about this.

- Inadequate handling by untrained staff, physical damage
- Mould may develop inside enclosures if they are sealed too tight and packed in a humid environment

6. Actions required to maintain desired standard over time

Make sure you consider the additional issues or risks you identified in no. 5 above.

- Name one or more people who will be responsible for the storage rooms (i.e. for dusting and regular cleaning)
- Change air filters periodically
- Inspect air filters twice a year
- Inspect collections twice a year
- Inspect spaces at higher risk once a month
- Clean storage rooms once a week
- Train cleaning staff
- Develop written procedures for the maintenance of collections
- Train staff to apply the new procedures

7. People involved in implementation of actions identified in no. 4 and no. 6

Everyone: maintenance staff, building services, storage decision-maker, conservator, curator



Resource 13 - Creating a comprehensive project chart

This is an example of a comprehensive project chart, used to plan out your entire reorganization project – not just the physical reorganization.

A	B	C	D	E	TASKS	WHO	MONTH					
Administrative tasks	Part of current responsibilities	Requires funding	Requires funding (next 3-5 years)	Training			MAY	JUN	JUL	AUG	SEP	OCT
					1	Inspect collections to identify areas where dust is more prevalent						
					2	Purchase portable dehumidifiers						
					3	Purchase cleaning equipment						
					4	Dust objects						
					5	Re-house objects						
					6	Seal windows and doors						
					7	Replace filters in ventilation system (every 3 months)						
					8	Set up a periodic cleaning schedule						
					9	Limit the ingress of people in storage (source of dust)						
					10	Draft new procedures for maintenance and inspection of spaces						
					11	Train staff						

This is one way to group tasks by type, based on the resources required to implement them. Something to think about...

Who will carry out this task? It might be internal staff, volunteers, contract workers, interns.

The timescale will vary depending on the scale of your project and the resources required.

Keep the tasks descriptive, but not so detailed that you end up with hundreds of tasks.

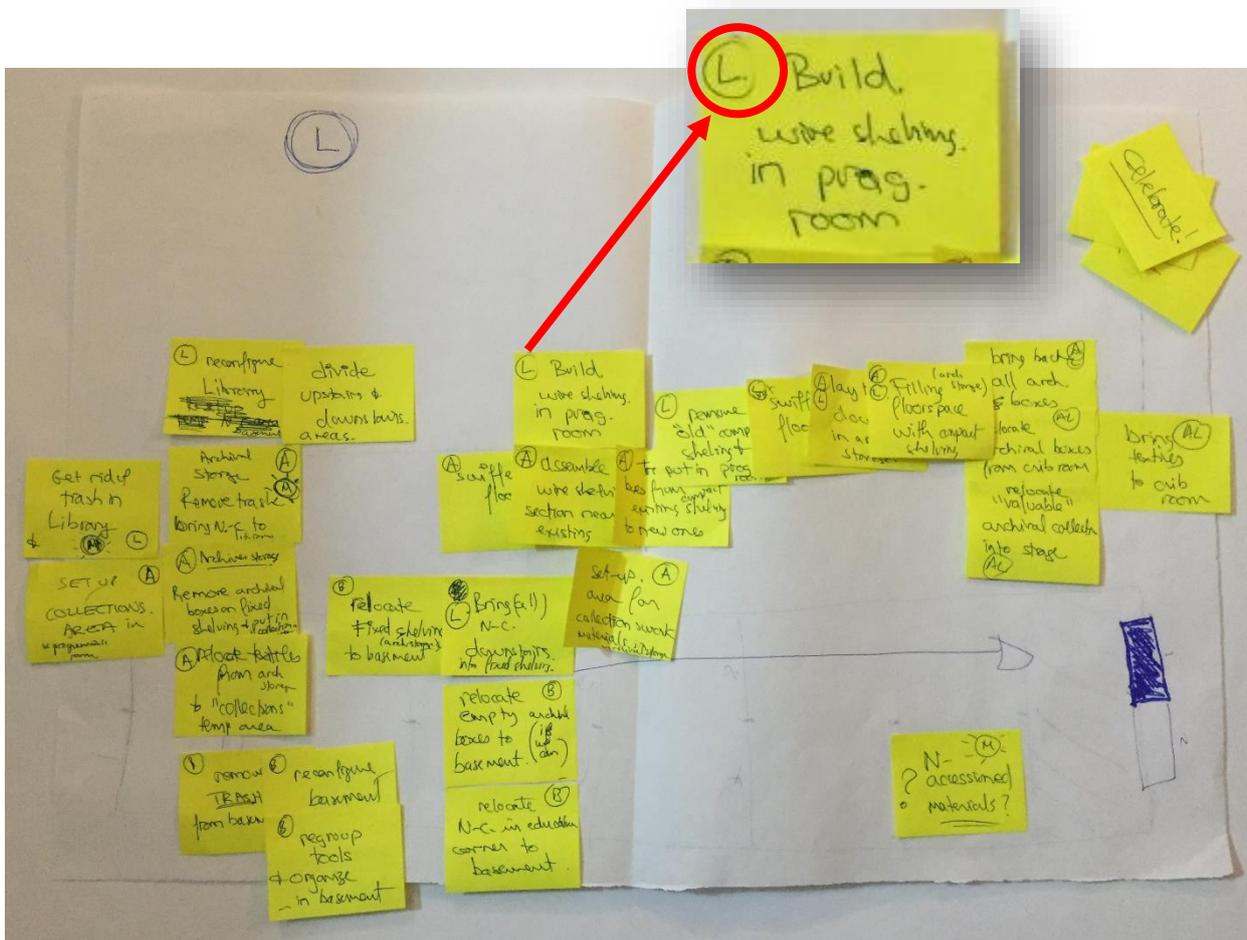
Some tasks have dependencies, i.e. you must do 1 before you do 5. When this happens, indicate dependencies by writing the number(s) of the tasks that must be completed before another one can begin. If 7 and 9 happen at the same time and must be done before 8, then you would write "7, 9" in the first box of 8.



Resource 14 - Simple steps to creating a RE-ORG tracking chart

Step 1: Define tasks. Brainstorm with your core project team to determine the different tasks that are required to bring your storage room from a disorganized to an organized state. In Phase 3, you identified some of these tasks and included them in your Comprehensive Project Chart. This is an opportunity to validate them and to add any missing tasks. This implies that you have already spent some time thinking about how your space will look once the reorganization is complete. It is often more productive to have a small team work on this chart, rather than doing it with a large group.

- Use sticky notes (one per task) to allow you to rearrange them more easily. As you stick them to your paper or wall, place them loosely according to the timeline. Ask yourself: does this need to happen at the beginning or towards the end? Try to do this each time you stick a new sticky note.
- One way to ensure you do not forget any tasks is by thinking in terms of *what needs to happen and where?* To do this, think of the various spaces that will be affected by the reorganization (e.g. Storage Room, Basement, Education Room), and determine what needs to happen in order to get from start to finish.



In this example, a circled letter was added to each sticky note (A, B, L), corresponding to Archival Storage, Basement and Library. In this case, these were treated as separate mini-projects, which made it easier to divide the team (20 people) into smaller teams (of 3-7 people). Sticky notes were arranged from start (left) to finish (right) and any tasks that could happen at the same time were stacked vertically.

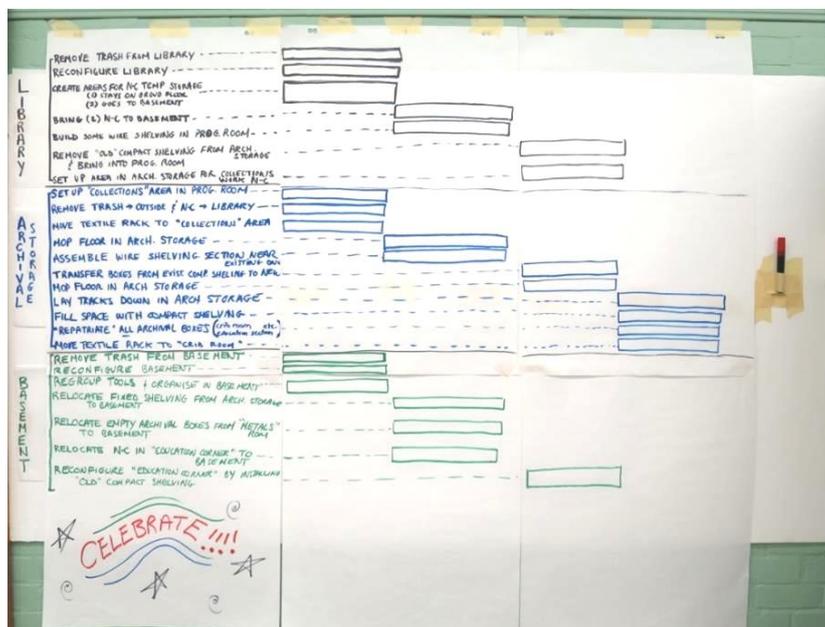
Image courtesy of Brant Museum and Archives, Canada

Step 2: Sort tasks. Confirm the order in which the tasks must be carried out by moving your sticky notes around as needed. Once you are reasonably happy with the order of tasks, draw vertical lines on your paper to divide your sheet into 3 or 4. These will help you group your tasks into phases, allowing your team to see progress as it happens.



In a normal project chart, you would put a lot of effort into ensuring that all the dependencies are accurate. For this kind of chart, as long as they are loosely grouped in chronological order is sufficient, as the team(s) will have some latitude to discuss in more detail what should happen in what order. Image courtesy of Brant Museum and Archives, Canada

Step 3: Create your chart. It is often easier to assign tasks to smaller teams according to where they will be working and on what. On a large piece of paper, write down all the tasks along the left – remember to group them by team and working area. Consider using a different colour marker for each team. Write the tasks according to the order you established in the previous step (1, 2, 3, and 4). For each task, draw an empty rectangle, which your team members can use as a progress bar. You could hang this poster up in the break room so all members have access and can update the chart as the project progresses. Do not forget to celebrate at the end!



In this example, the tasks were grouped in 4 phases, as can be seen by the 4 columns of rectangles (from left to right). Furthermore, at the brainstorming phase, it made sense to group the tasks according to location (Library, Archival Storage, and Basement). This made it easier to split the team into 3 smaller teams.

Once the chart was presented to the team as a whole, they were asked to volunteer to work in one of the 3 rooms. The amount of people in each team was determined by the complexity and scope of the work. The teams that finished earlier than the others simply joined another team to help them complete their tasks. Image courtesy of Brant Museum and Archives, Canada

Stay flexible. No matter how much planning goes into your chart, unexpected things will happen and decisions will be revisited. The chart gives direction to your project, but you must leave room to adapt it along the way.

 **Resource 15 - Keeping track of object locations**

Step 1: “Mirror” the existing location system. This can be done on the floor or by using temporary storage units.

Step 2: Move objects into their “mirror” location. This can be done shelf by shelf if you have a smaller team, or several shelves at a time if you have a larger team. Because the original locations are mirrored on the floor, the likelihood that errors will occur is minimized.



In this example, a grid system was created on the floor using masking tape. Each location (rectangle) corresponded to one shelf in storage. The location system used in storage was alphanumeric (1A, 2A, 3A, etc.), so pieces of paper along the back wall indicated rows A, B, C, D, E, etc. and F, while rows along the left wall indicated 1, 2, 3, 4, 5, etc.
© ICCROM

Temporarily emptying a storage room requires a large amount of floor space. If the original storage room has shelving units with 5 shelves, you will need about 5 times more floor space to accommodate all objects since they are now being placed on a single surface. To protect the objects from abrasion, line the floor with polyethylene foam. Both images © ICCROM



Resource 16 - Creating a simple location system

When is this necessary?

- There is no location system in storage
- The storage location system has codes that
 - are too complex (e.g. GH1-569-3345-10L);
 - are inconsistent throughout the facility (e.g. Shelf 3, M89, 12F-01-02);
 - that refer to too large a location (e.g. Room 1, West Wall, etc.) making it impossible to find objects within a reasonable timeframe (i.e. 3 minutes, or whatever timeframe you consider acceptable)

Objective: Create a permanent location system in storage that is simple, expandable, logical and consistent (one letter, one number), allowing anyone to physically locate any object in the collection, starting from the documentation system, within a reasonable timeframe (i.e. 3 minutes or whatever timeframe you consider acceptable).



The proposed system uses letters for shelves (from bottom to top) and numbers for the units. Both images © ICCROM



Why letters for shelves and numbers for units?

You are more likely to have over 26 units than you are to have over 26 shelves. Using letters to identify shelves allows you to avoid having units that are identified as “AAA” or “CC” or “ZZZZ”.

Why use letters from the bottom upwards?

You are much more likely to add additional storage surfaces **above** the existing units rather than **below** them. So, if you find yourself needing to create extra space and you happen have wall space above a shelving unit whose last shelf is identified as “H”, then the new location can simply become “I”.

What if in the future I decide to add shelves in between existing shelves... would I use A, A.1, A.2, B, B.2?

We do not recommend this because it adds a layer of complexity to your location system. Instead, when you are labelling your shelves from the very beginning, skip a few letters (e.g. for a unit with 5 shelves: A, D, G, K, N). That way, if you ever choose to add an extra shelf between the lowest and second lowest shelf (i.e. between A and D), you could simply label it “B”.

I am numbering all my units as suggested, but what happens if I decide to add extra units later on? The numbering sequence will not be continuous.

In fact, we recommend numbering all locations that are currently empty: empty floor space where a unit could be added, empty wall space where a rack or a large object could someday be added. Planning ahead in this way makes it easy to maintain your system.

When I must retrieve an object in location “45G” for example, is there a simple way to know where that is in my storage room?

Yes, try creating a map of your storage room locations using a floor plan. Post the map near the entrance so that it can be used by anyone working in storage.

I have more than one storage room. Would you suggest keeping the number sequence from one storage to another or starting a new number sequence?

If you keep numbering storage units in the same sequence from one storage room to another, it could become confusing. In addition, if you ever add another unit in your first storage room, your numbering system would be out of sequence from one room to another. It is one thing if numbers are out of sequence in the same room, but it is another when they are out of sequence between two or more rooms. It quickly becomes very disorienting. Instead, use a prefix (e.g. Roman numerals) to identify rooms. For example, the location codes in your first storage room could be: I-45G, while the codes for the second room could be II-34H, and for the third: III-3D.



Resource 17 - Accounting for collection growth

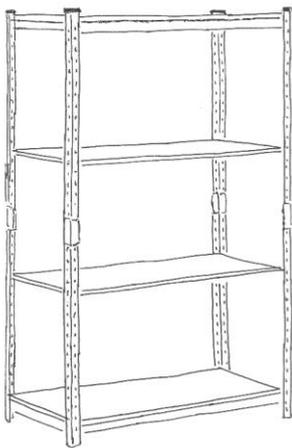
Approximate method. This method, the preferred method for RE-ORG, is based on common sense, and allows you to consider the current fullness of your storage room(s). Also, it does not assume that you necessarily need more floor space. Perhaps once you have completed your physical reorganization, you will still have room to grow for a few years because you were so effective at finding space efficiencies! This should count for something. Have a discussion with management about the parts of the collection that are likely to grow and those that are not likely to grow in the next 10 years. Then develop a list of extra units (quantity and type) you will need to accommodate this anticipated growth. Add this list to  **Worksheet 10**.

Floor space method. This method examines how floor space needs increase as the collection grows. The principle is simple: you multiply the current total floor space of your storage rooms by the annual growth rate of your collection, and this will tell you how much extra floor space you need every year. This assumes that your storage is full and that you need extra floor space to accommodate the growth, which may or may not be the case. It also assumes that the collection grows predictably and regularly. To determine the annual collection growth rate, there are two options:

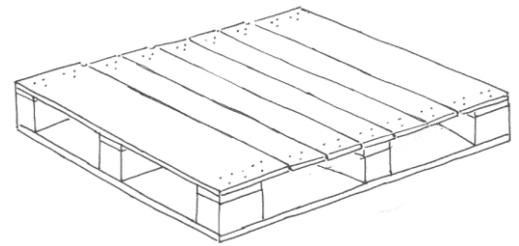
- 1) **Numerical increase.** Count how many objects have been acquired in the past 10 years, and divide by 10. This will tell you how many objects are acquired every year, on average. Divide this number by the total number of objects in your collection and multiply by 100. This will give you the annual collection growth rate (%). This approach could work if your collection comprises objects that are not too large and that are fairly regular in size. Multiply the annual collection growth rate (e.g. 1.5%) by the total floor space of your storage rooms (e.g. 200 m²) to find out how much extra floor space you need (3 m²). Finally, multiply this value by the number of years you are planning into the future (e.g. 10 years, meaning that 30 m² are needed). This assumes that the room height of current and future spaces are the same because it only considers at floor space occupation.
- 2) **Volumetric increase.** This is a little more time consuming and assumes that your documentation system includes the dimensions of objects. It may be an option if your collection comprises objects that are larger or that are very irregular in size (many small objects and many large objects). Be sure to use the same unit of measurement, either cm or m (in or ft), throughout your calculations. Calculate the total volume of the objects that have been acquired in the past 10 years, and divide by 10. This will tell you how much collection volume is added to your storage rooms every year, on average (yearly volumetric increase). Note that if some of the objects are crated in storage, you need to factor this in (e.g. by applying a crating factor of about 25-30% to the volume of those objects). Divide the yearly volumetric increase by the height of your storage room. This will tell you how much extra floor space you need every year. Then, you need to account for circulation space, since, we have assumed that objects are packed tightly against one another. To do this, multiply by 2 to apply “The 50% rule” (or 1.25 if you have compact shelving). This gives you the floor space required, including circulation and access space. If you are planning for 10 years, multiply this floor space requirement by 10.



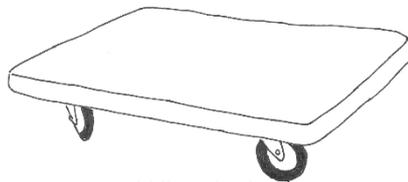
Resource 18 - Visual reference guide for storage furniture



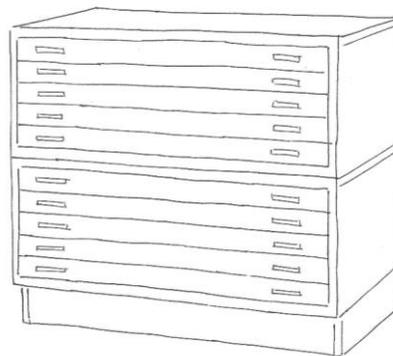
Shelving unit / racking / shelves / adjustable shelving / fixed shelving unit (not mobile)



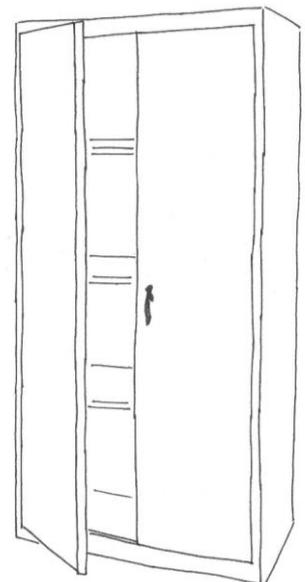
Pallet / skid



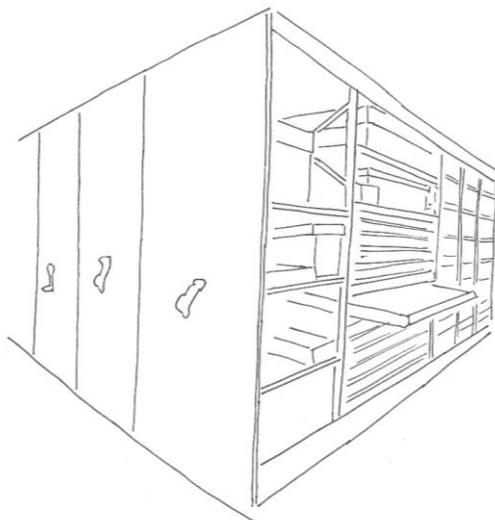
Wheeled platform / Dolly



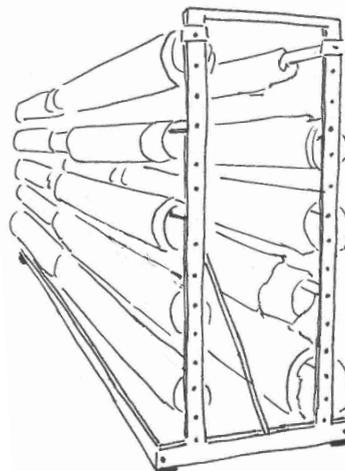
Drawers / Drawing cabinet / Map cabinet / Drawer cabinet / Cabinet of drawers / flat drawers / drawer unit



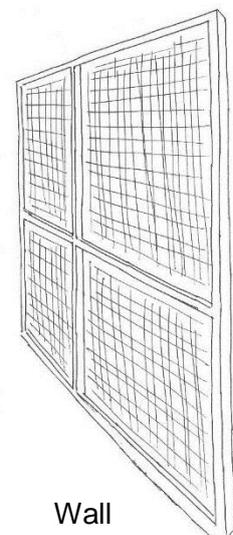
Cabinet



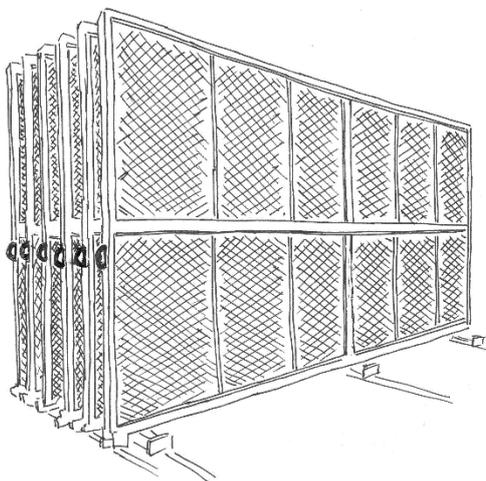
Compact shelving / Mobile shelving / High-density storage



Rolled textile unit / rolled textile system / adjustable rolled storage



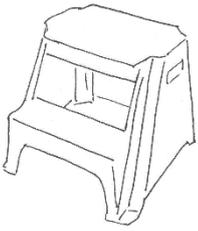
Wall rack / wire rack storage / storage screen



Sliding racks / picture racks / painting racks

 **Resource 19 - Visual reference guide for small equipment**

Reaching



Step stool



Kick stool with wheels



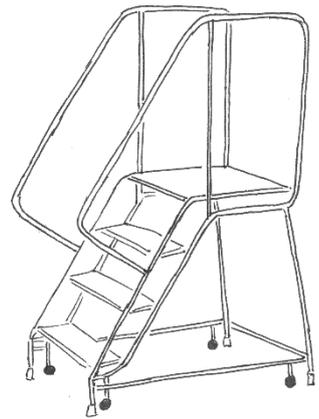
Extension ladder



Double-sided ladder

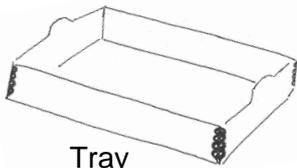


Step ladder



Mobile ladder with platform

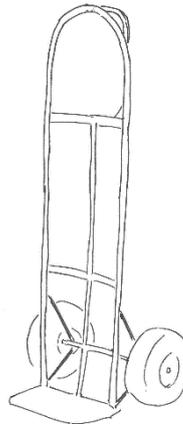
Handling



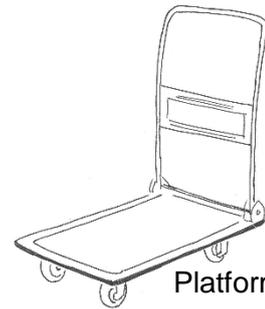
Tray



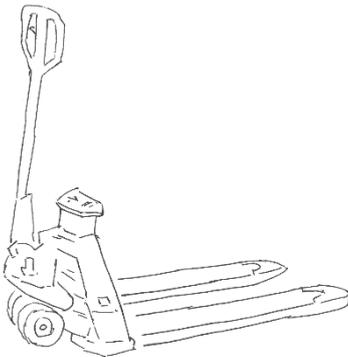
Trolley



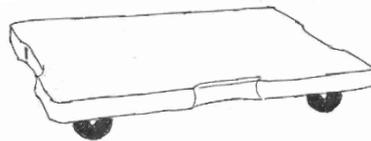
Hand truck



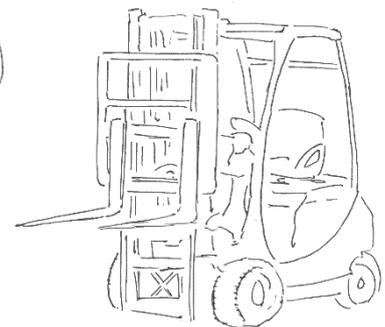
Platform truck



Hand pallet truck

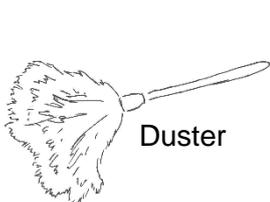


Dolly

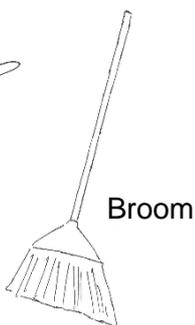


Forklift truck

Cleaning



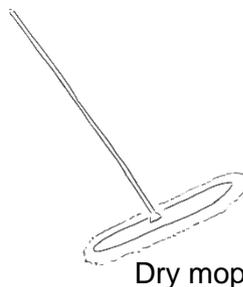
Duster



Broom



Vacuum (hand-held)



Dry mop



Shop vacuum