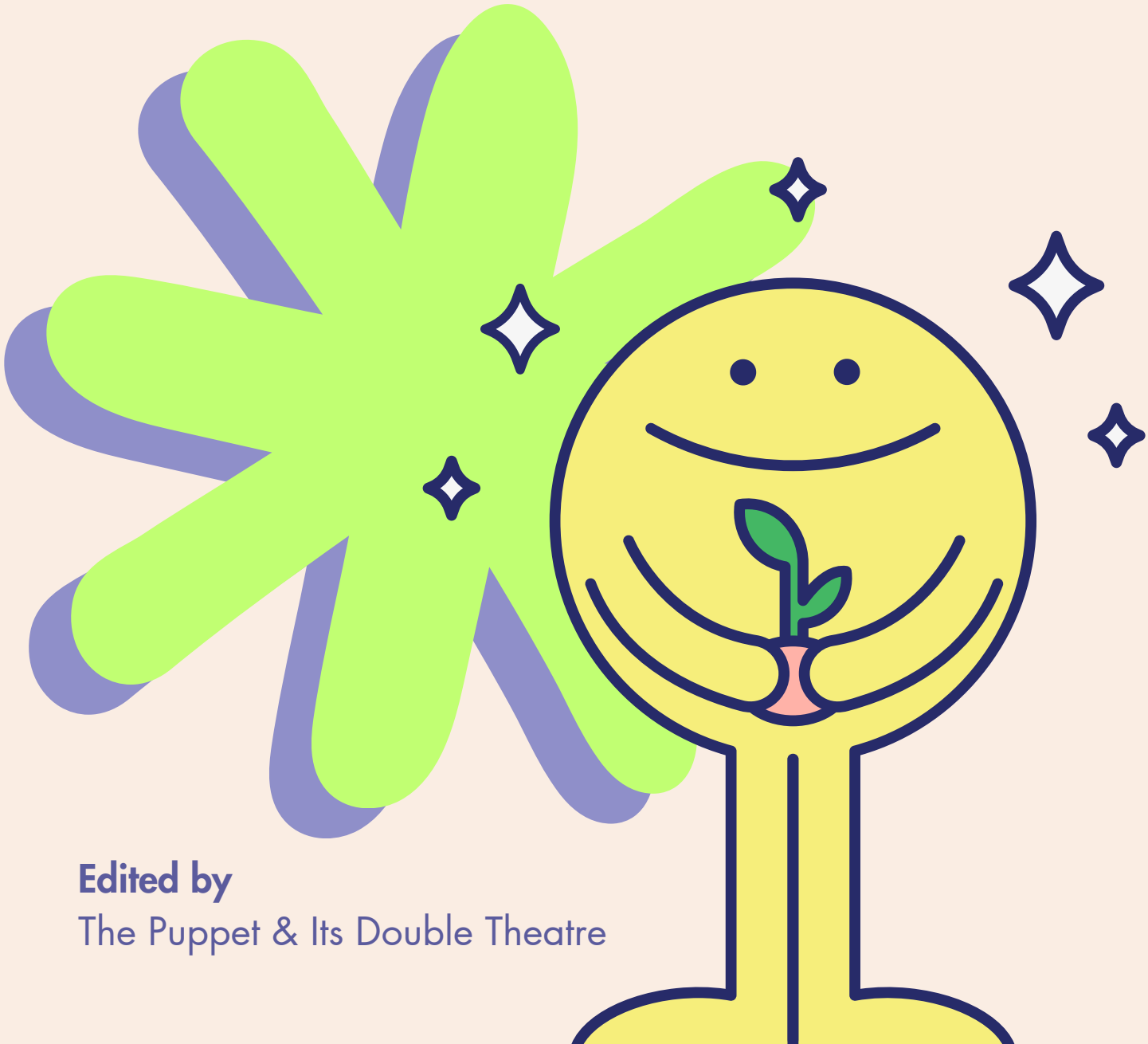
A Guide to GREEN WORKSHOP

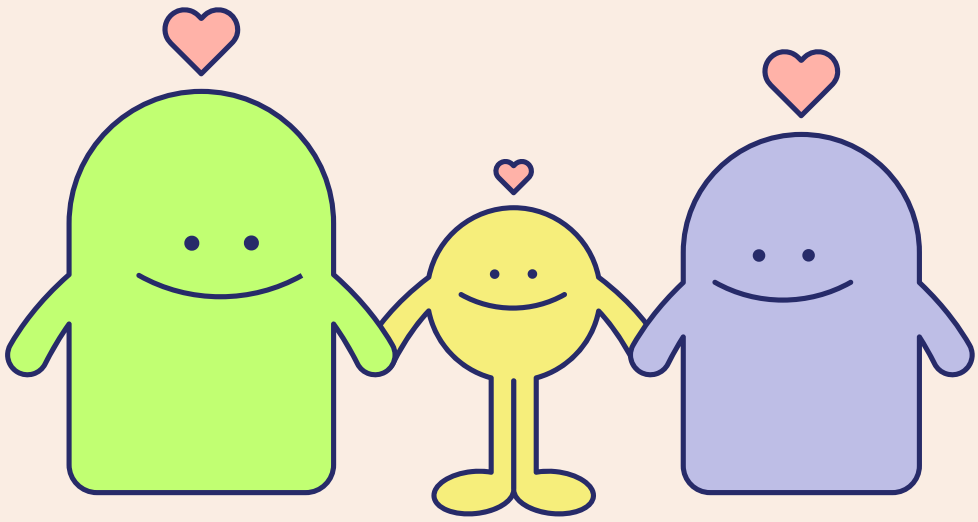


Edited by
The Puppet & Its Double Theatre

Sustainable development is about

"meeting the needs of the present without compromising the ability of future generations to meet their own needs."

Our Common Future, United Nations



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Chapter 1
To Be Sustainable

Prologue

In 2015, the United Nations
established 17 Sustainable Development Goals,
and the National Theatre of the United Kingdom
published the Theatre Green Book in 2019.

Subsequently,
The National Theater and Concert Hall of Taiwan
have been committed to becoming sustainable venues.

In 2023, Puppet and Its Double Theater Company launched a two-year residency program focused on sustainability, exploring the possibilities of sustainable production. The program began with lectures and readings, gradually making adjustments to the environment and ways of working.

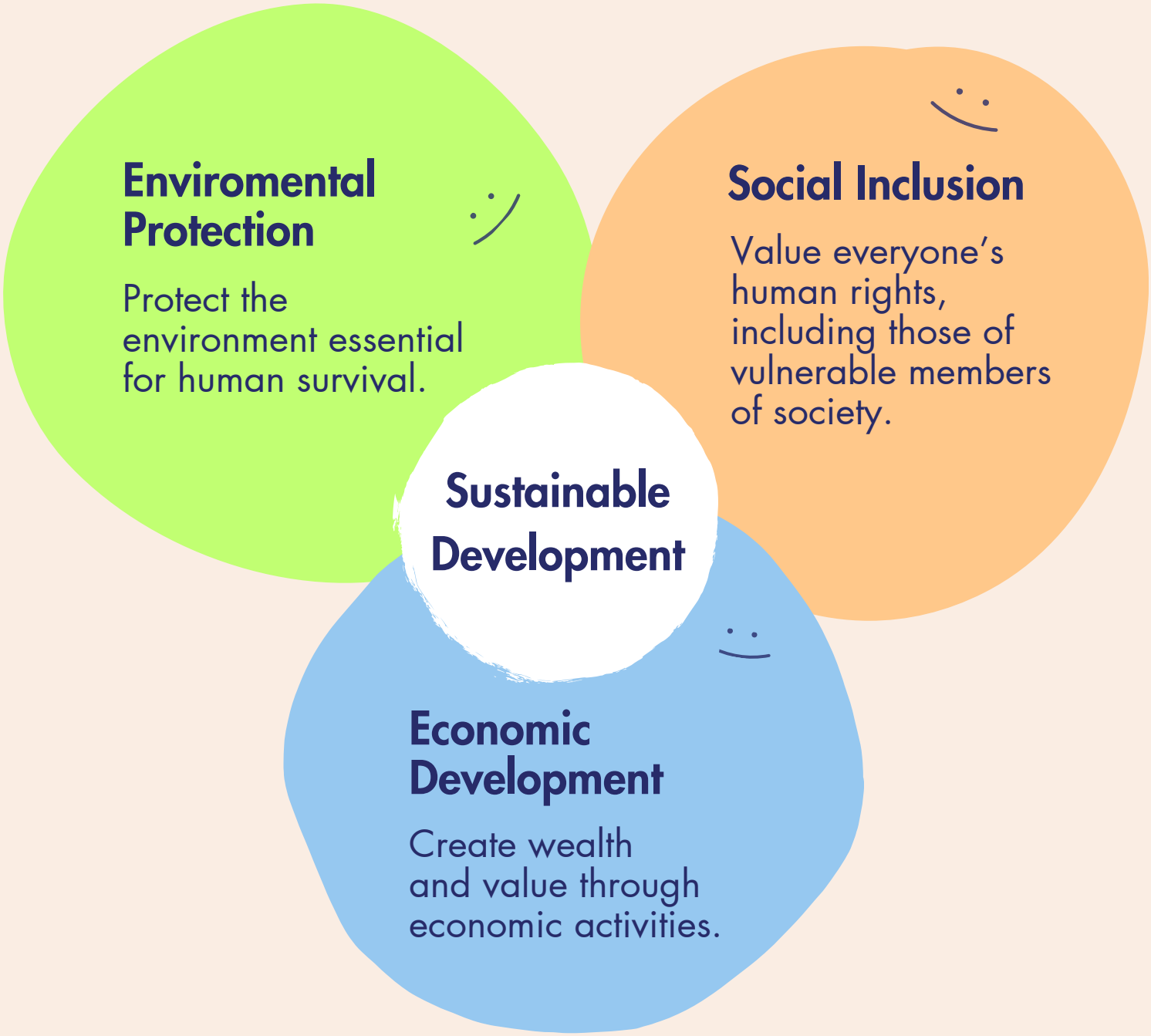
What is A Guide to Green Workshops?

This guide aims to enhance the sustainability of theater production. Drawing from the SDG Compass developed by the United Nations Global Compact, we have established a **"puppet value chain"** that analyzes the various processes of puppet production from design, purchasing, and production to performance and retirement. Each process is evaluated for its positive and negative impacts on sustainability, with particular emphasis on resource usage and control during the **"making"** stage to achieve sustainable production.

The guide covers the production of puppets and stage props, addressing each stage step by step.

In our analysis,
we focus not only on environmental factors
but also incorporate economic and social dimensions.
As highlighted in the Sustainability Agreement,
the economic, environmental, and social dimensions are interconnected and indispensable. Sustainability in the industry cannot be maintained if these aspects are considered in isolation.

BALANCING THREE KEY ELEMENTS



Source of the chart: 60分でわかる! SDGs超入門
redesign by Puppet And Its Double Theatre

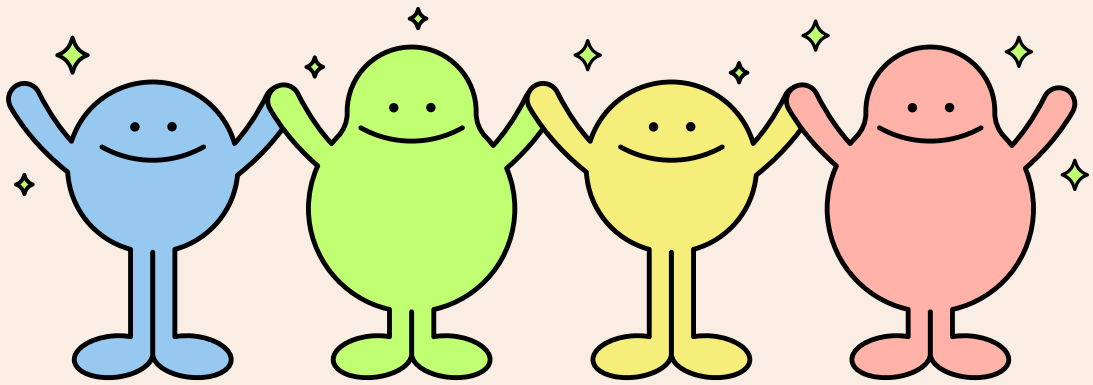
Who should read it?

This Guide intended for
theatre arts production and related industries.

However, achieving sustainability is not the responsibility of the production side alone. It requires the understanding and active participation of designers, directors, producers, and **other creative and administrative stakeholders.**

The early stages of design and conceptualization offer the greatest flexibility in resource allocation, including time, money, and human effort. Decisions made at this stage are crucial in determining whether sustainable production can be achieved in the future.

Therefore, this guide is suitable for all roles within the theater production team.

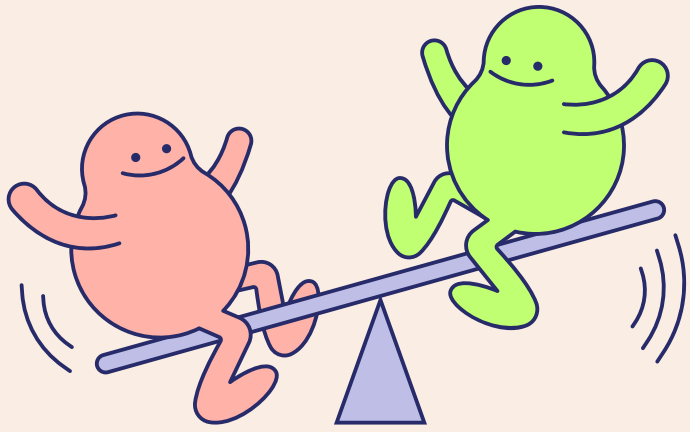


What do you need to know to be sustainable?

In the past, our approach to work was primarily pragmatic. However, as we began to prioritize the environmental impact of manufacturing, saving time and reducing material costs were no longer our only focus.

Therefore,
sustainability is hardly a short-term cost or time saver.
It requires building on past experiences, redistributing misplaced or wasted resources, and investing time and money where they are truly needed.

Throughout the process, we will encounter new choices, seeking ways to do what is best for both the environment and ourselves.



FACING THE CHOICES: STEP 1

For example, when disassembling a prop secured by a complex arrangement of wires, we might take the following steps:

A Spend 15 minutes carefully removing the wires for further use.

B Spend 2 minutes cutting the wires and recycling them.

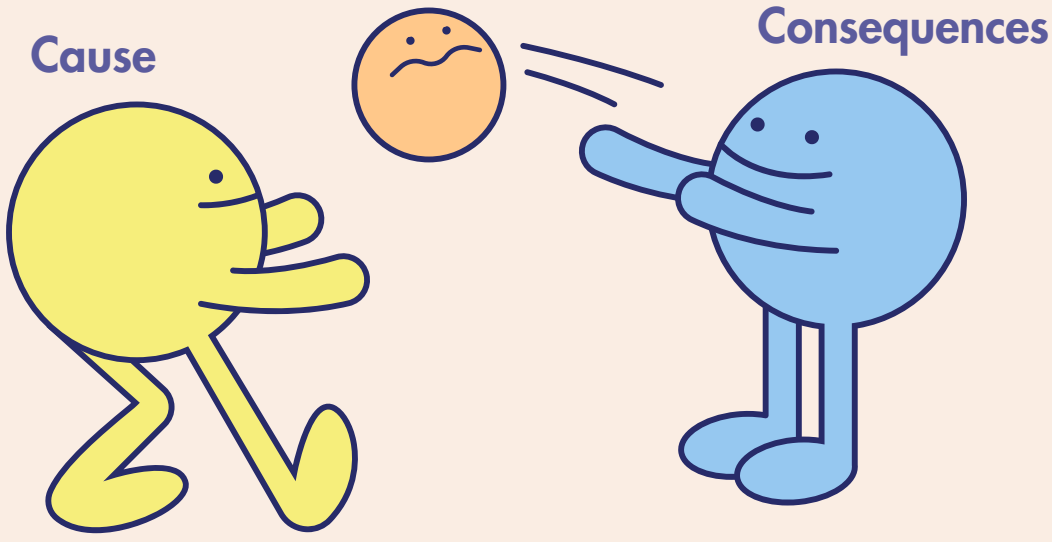
C Just discard the prop.

FACING THE CHOICES: STEP 2

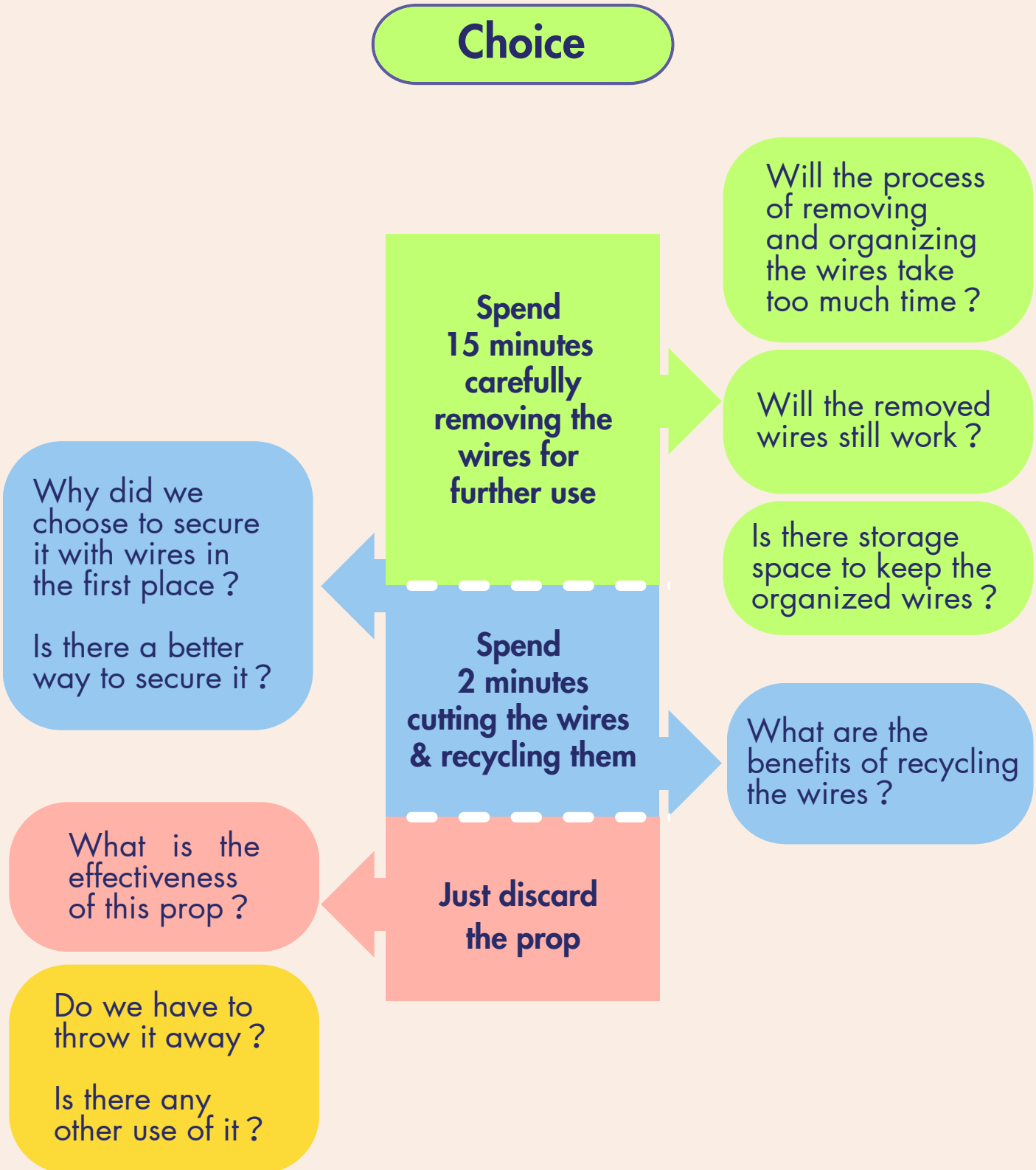
In such situations, we aim to take actions that minimize environmental impact while also considering whether we are significantly increasing disposal costs.

When addressing an issue, we should avoid focusing solely on the immediate problem and instead consider its underlying **causes** and their **potential implications** for the future.

A comprehensive understanding of the causes and consequences can guide us toward making more appropriate choices.



POSSIBLE QUESTIONS TO ASK



Chapter 2
Puppet Value Chain

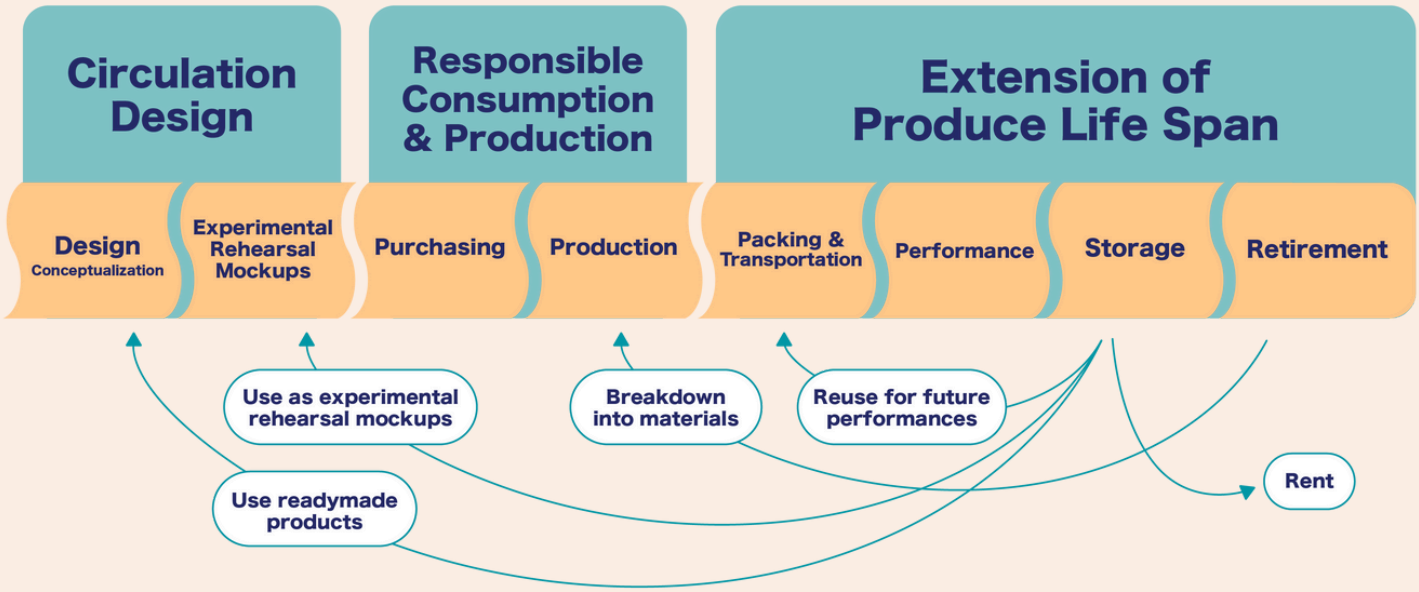


What Is Puppet Value Chain

Understanding the causes and effects of the entire process can help us avoid becoming fixated on a single issue.

To address this, we have developed the "Puppet Value Chain", which illustrates the flow of value from the beginning to the end of the puppets, along with the interactions with upstream and downstream partners.

This framework helps us comprehend the role and impact of each link in the chain, ensuring overall effectiveness and sustainability.



The eight stages of the Puppet Value Chain

THE 3 MAIN PARTS OF THE PUPPET VALUE CHAIN

Circulation Design

Incorporating the concept of circular design during the stages of design and experimental rehearsal mockups helps minimize resource wastage at the source, laying a sustainable foundation for subsequent production and use.

Responsible Consumption & Production

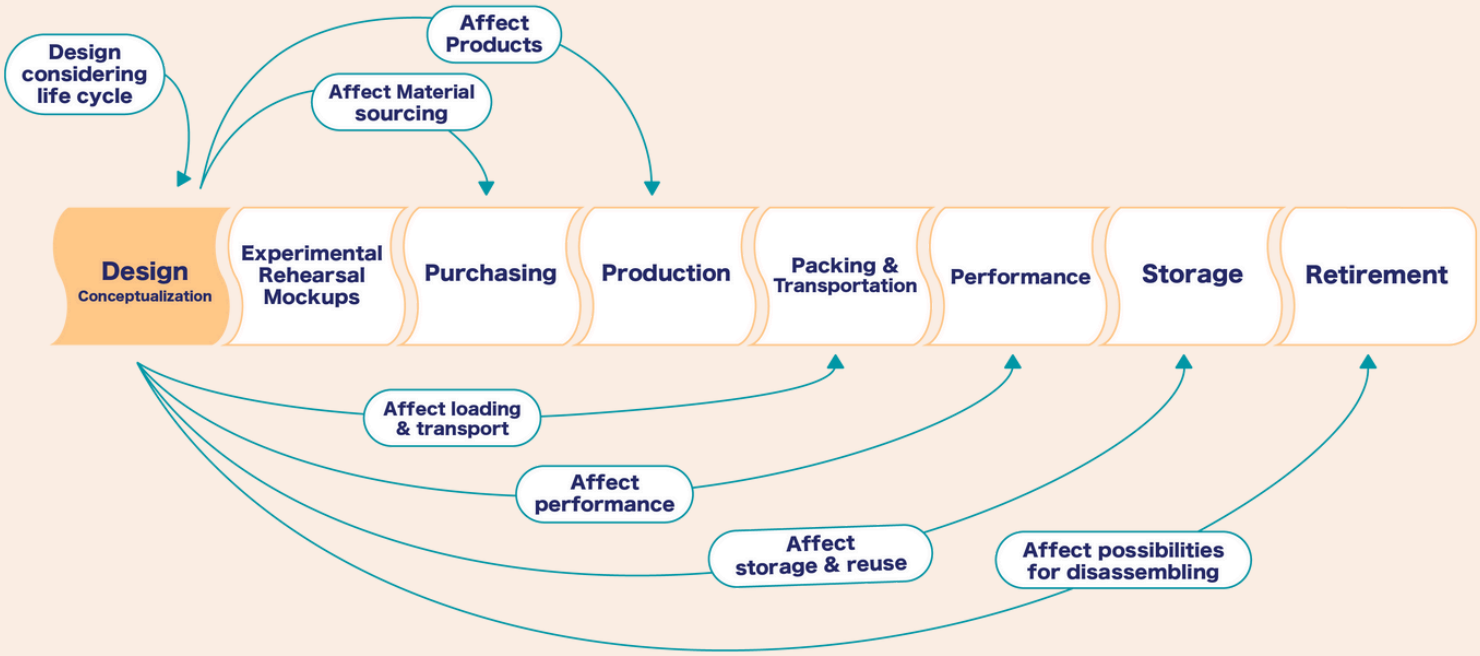
Making responsible choices during the sourcing and production stages minimizes environmental impacts and ensures the sustainability of the entire production process.

Extension of Product Life Span

Extending the lifespan of puppets and props during the transportation, performance, storage, and retirement stages reduces resource waste and maximizes their usefulness. The green arrow in the "Puppet Value Chain" illustrates the path of extended product use, a crucial element of circular design.

Design Conceptualization

Decisions made during the design stage significantly impact the sustainability of subsequent processes. This stage also offers the greatest flexibility to adjust the form and content of a play, making it the **ideal time to refine the direction of the production.**



Q1 FOR THE BRAINSTORMING & DESIGN PHASE

During the Design Conceptualization stage, follow this sequence of reflective thinking:

Q1. Do we really need these products?

Examine the necessity of the creative elements and determine whether the design is driven by actual need or habitual practices. For example:

- Is it possible to replace a puppet that is used for only a few seconds with the performer's body ?
- Does the setting need to be large and realistic, or can it be represented symbolically ?

Consider

If the funding is reduced to 2/3, how can we present a good show ?

Reminder

Sustainability does not mean sacrifice; it **encourages rethinking and communication**. Where there are limits, creativity thrives.

Q2 FOR THE BRAINSTORMING & DESIGN PHASE

Is it possible in your design to rent or buy used resources?

- Small props and costumes are often available secondhand.
- Large-scale theaters can explore rentable stage components, such as platforms and staircases, with designs that can be adapted to existing resources.

Reminder

- Building A Database for Used Resources: Regularly collect and organize relevant sources to improve efficiency in locating used materials.
- Used resources have unique characteristics that may not always be ideal but can inspire creative ideas. Designers must remain flexible and adaptable, creating designs from ready-made objects or standardized stage sets that align with the plot.

Second-hand resource rental providers are listed in the appendix of this guide.

CASE STUDY



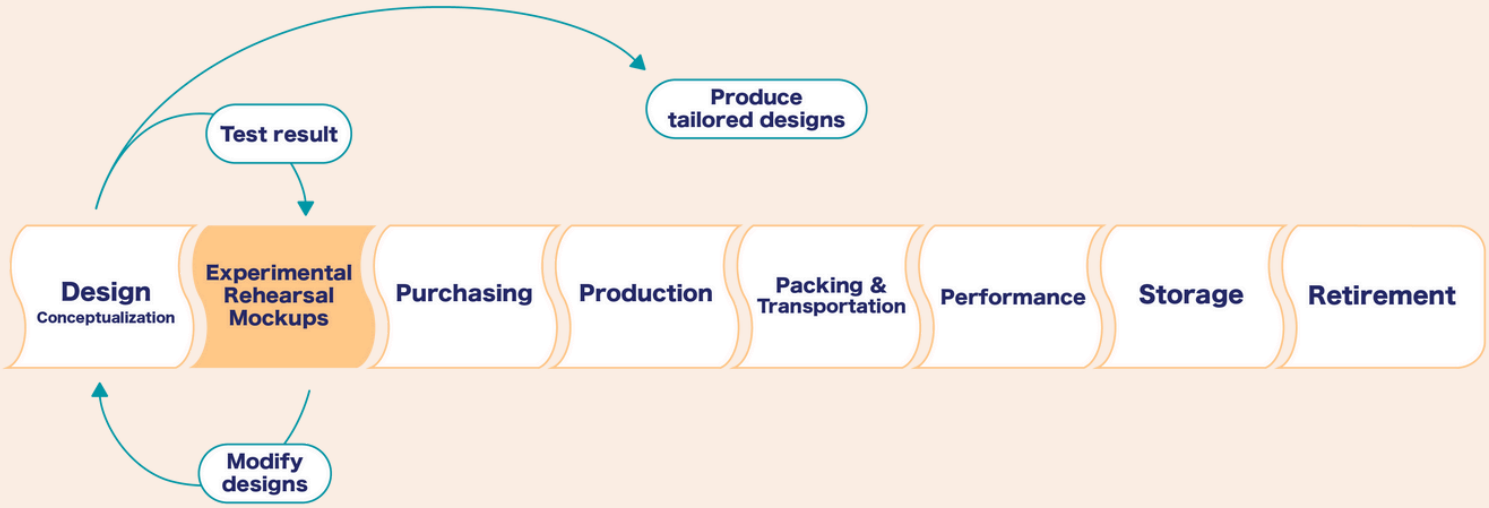
2023 Materials Adventure on Puppet Builder's Workbench **- Creative Process -** The stage floor from the previous production was disassembled & repurposed into a patchwork-style stage carpet for the new play.

Q3 FOR THE BRAINSTORMING & DESIGN PHASE

How sure are you about the effectiveness of the product?

- Is this approach based on previous experience or is it a new attempt ?
- If it is a new attempt, we can minimize the risk of resource wastage in the next stage by using **experimental rehearsal mockups**.

Experimental Rehearsal Mockups



During the design stage, innovative forms that have never been tried before may be conceived. However, there is no guarantee that the actual outcomes will align with expectations.
If such uncertain designs proceed directly to purchasing and production, only to be deemed ineffective during rehearsals, this can result in significant waste of materials, money, and time. Such practices are inconsistent with the principles of "green production".

To mitigate these risks, incorporating a **stage of "experimental rehearsal mockups" between design and purchasing becomes essential.**

For instance, rehearsals can be conducted using similar old puppets to **verify that the design meets expectations.** Additionally, the stage height can be simulated using substitute benches or wooden crates.

The reason for using rehearsal dummies during rehearsal mockups

The goal is to achieve effective testing at the **lowest cost** and **in the shortest time**.

By following the process of **'Substitute Development → Design Adjustment → Continued Substitute Development,' the design can be refined to better meet the requirements**.

Since substitute mockups are intended for short-term testing, their production methods can align with the 'Processing Methods for Short-Term Use' section in Chapter Four, 'Production.' This approach enables recoverable processing, minimizing resource wastage and supporting sustainable practices."

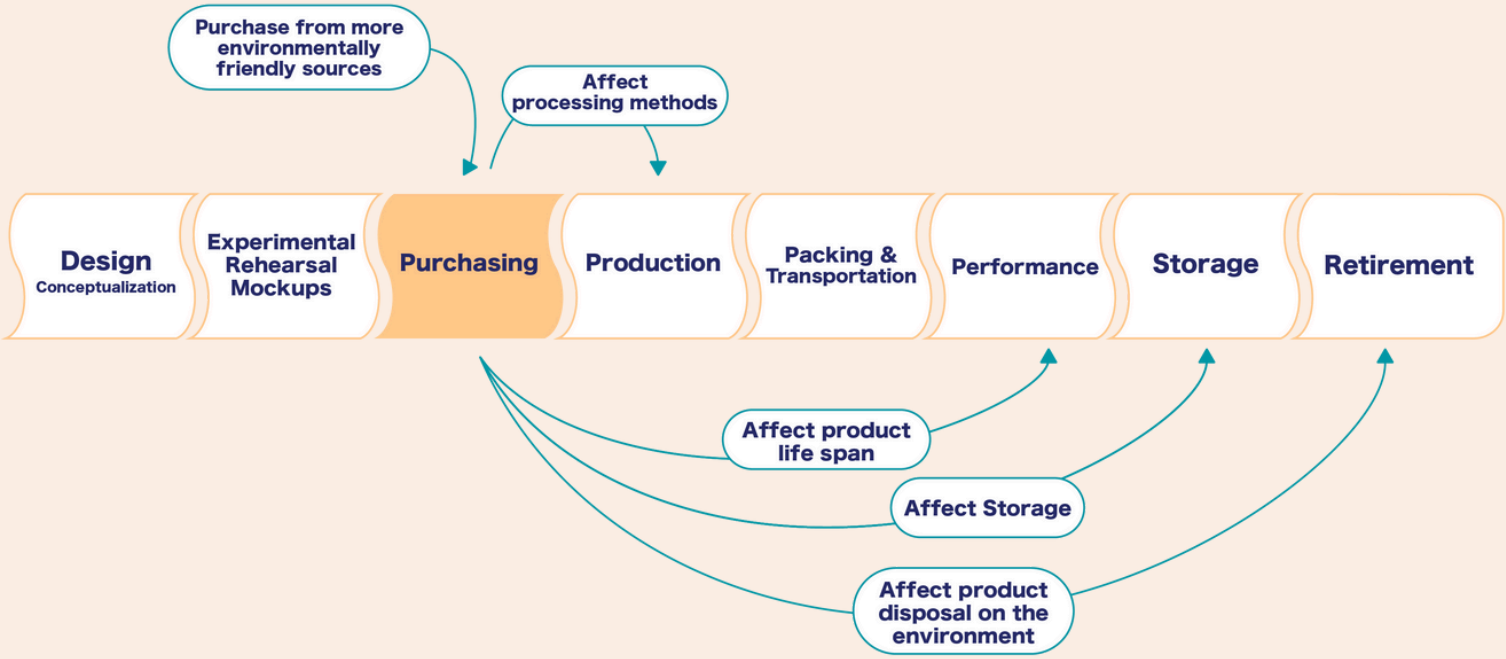
CASE STUDY

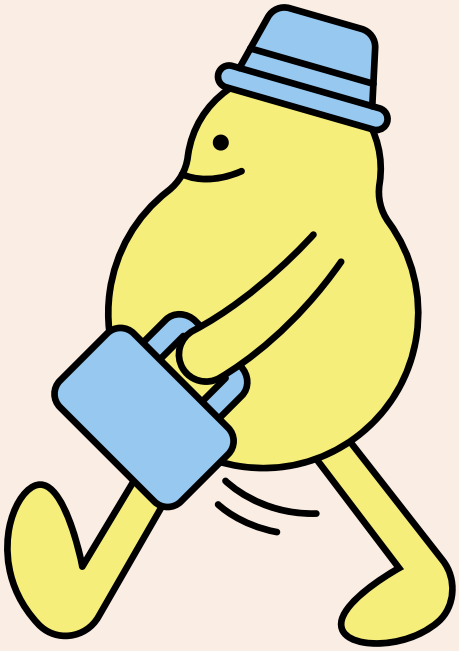




***2022 The Selfish Giant* - Creative Process -**
During the 'rehearsal mockups' stage (left image), experiments were conducted using cardboard boxes & recycled paper. These mockups later evolved into the final props made from PP corrugated board, foam board, & fabric (right image).

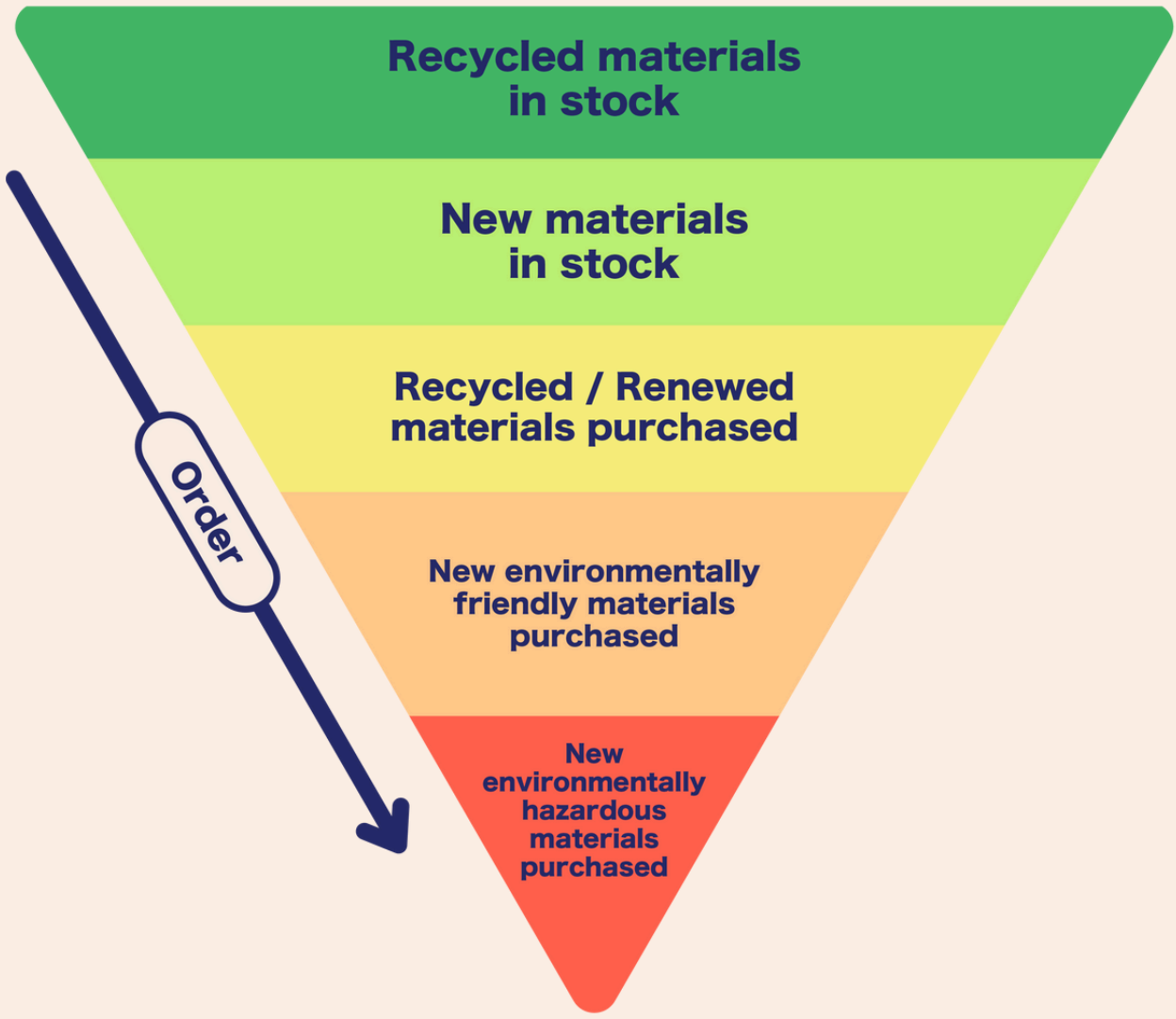
* Purchasing *


Purchase from more environmentally friendly sources
Affect processing methods
Design
Conceptualization
Experimental Rehearsal Mockups
Purchasing
Production
Packing & Transportation
Performance
Storage
Retirement
Affect product life span
Affect Storage
Affect product disposal on the environment



PRIORITY ORDER FOR MATERIAL SELECTION [1]

After creating a product list, more sustainable options can be prioritized when purchasing materials, following this order:



[1] The inverted pyramid chart and the concept of material selection priority are derived from The Theatre Green Book Version 2₀

SELECTION PRINCIPLES

Prioritize **materials in stock** over **new materials**

avoiding unnecessary purchases.

Prioritize **local materials** over **foreign and imported materials**

reducing carbon emissions associated with cross-country and international transportation.

Prioritize **environmentally friendly materials** over **hazardous materials**

alleviating the burden on the environment.

In Taiwan

Recycled materials readily available in Taiwan include OSB boards made from small wood pieces, recycled paper, and others.
However, most recycled material manufacturers in Taiwan primarily cater to bulk orders of customized products, making it challenging to purchase recycled materials in smaller, retail quantities.

Alternatives

Consider repurposing discarded materials from other industries. For instance, corner pieces of wood from a scenery factory may be too small for stage construction but are perfect for creating puppets and props. Similarly, materials removed from exhibitions, though painted or damaged, can still be reused. Such sources represent potential upstream manufacturers with whom long-term collaborations can be established.

Challenges

Identifying suitable upstream material suppliers can be challenging, as issues like unstable supply or material damage may arise. However, if both parties share a commitment to sustainability and maintain open communication about their needs, it becomes possible to use resources efficiently and reduce material costs.

RECOMMENDED PLATFORM

Online Platform

"We are always throwing things away"

a journey to become more environmentally friendly across all industries

Matchmaking industrial wastes and material users

Link: https://www.facebook.com/share/g/7msjNtuFVvPDfLvY/

CASE STUDY



Ridge Studio's Good Ideas Traveling Exhibition utilizes scaffolding for its structure and OSB boards for signs and panels. These materials can be reassembled and reused, significantly reducing waste from disposable exhibition boards.

LOCAL MATERIALS

To reduce carbon emissions from transportation, priority should be given to sourcing local materials.
However, as an island nation, Taiwan faces challenges in avoiding material imports entirely.
Instead, efforts can focus on maximizing the use of local materials or adjusting processing methods.
For example:

Consider

- Taiwan has an abundance of fast-growing **bamboo**. Could part of the structure be replaced with bamboo ?
- Most plywood commonly used in theater is imported, resulting in a high carbon footprint. When designing, consider **incorporating movable fixtures** or **modular structures to reduce the reliance on plywood.**



ORDERING MATERIALS FROM OTHER PLACES

When sourcing materials from other locations, consider the following points to enhance efficiency and minimize waste:

Advance purchasing planning

Allocate sufficient time for procurement to assess whether additional required materials can be purchased together or combined with orders from other departments. This approach helps reduce transportation costs and the carbon emissions associated with multiple shipments.

Avoid rush orders

The convenience of 24-hour delivery services often encourages repeated purchases of the same material, leading to unnecessary transportation and added strain on logistics workers' schedules.

Purchase frequently used materials all at once

It is recommended to purchase frequently used materials in bulk, including stock quantities, to minimize the need for repeated orders.

Environmentally Hazardous Materials-1 [2]

Avoid Formaldehyde and VOCs

Opt for low-formaldehyde, water-based paints and adhesives, and ensure the workspace is well-ventilated to safeguard the health of both processors and users.

CASE STUDY





Ridge Studio uses Ching Yeh Emulsion Paint, which carries the Green Building Materials certification mark. To prevent waste from spillage or paint drying out, they utilize a paint mixing lid, ensuring the entire can of emulsion paint is used effectively.

[2] The data is sourced from The Theatre Green Book.

ENVIRONMENTALLY HAZARDOUS MATERIALS-2

Reduce the use of plastic materials

The diverse range of plastic products poses significant challenges for recycling. Many plastics ultimately end up in landfills or are incinerated, releasing hazardous emissions and plastic particles that contribute to severe environmental pollution. Among these, **PVC plastics** are particularly crucial to avoid.

PVC

Its additives are harmful to the environment throughout its lifecycle—during manufacturing, use, and disposal. Since July 2023, Taiwan has banned the use of PVC packaging materials for food packaging and online shopping.

Common uses of PVC in theatre

Position-marking tapes, duct tapes, plastic wraps, water pipes, and similar items currently lack alternative materials. However, efforts can be made to minimize their usage wherever possible.






CASE STUDY



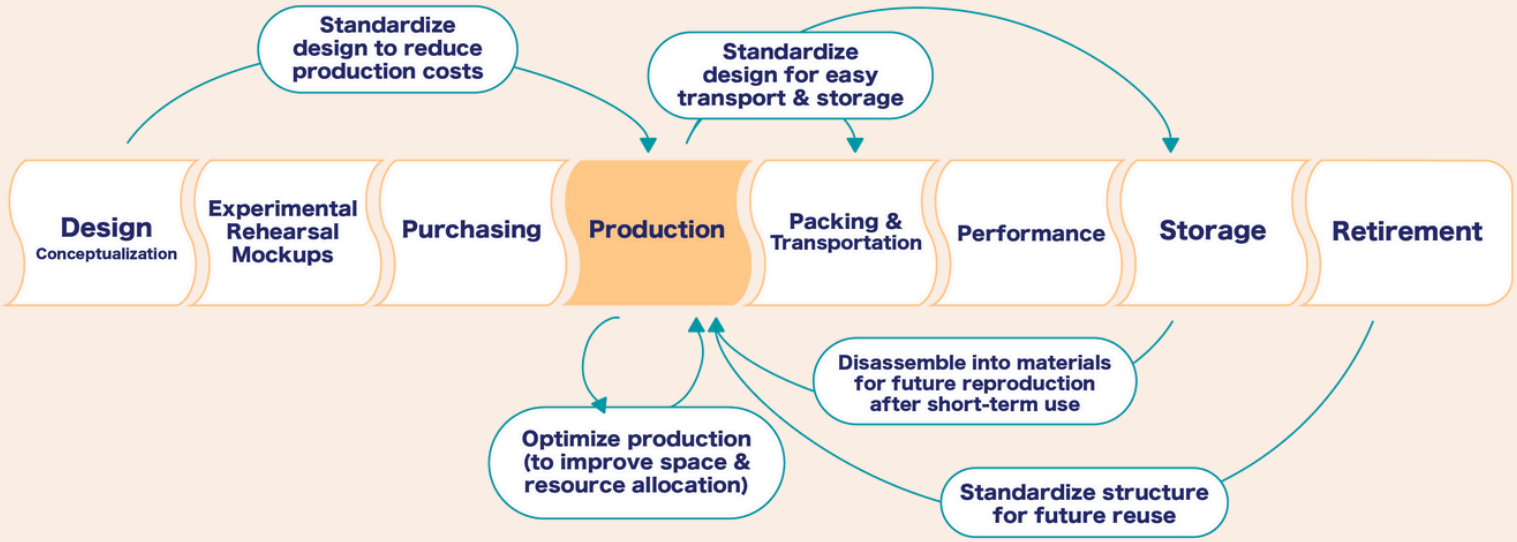
The Silver Grass Cultural and Creative Association uses steel pipes to collect stage tapes, allowing them to be reused in future projects.



Repurpose printed canvas from large-scale events as floor mats to protect surfaces from stains during puppet-making activities.

Consider How were puppets and props made before plastic became widely used ?

Production



The production cycle covers many aspects, from how to maximize the value of each material at each stage to examining the work situation and allocating space and resources for the most efficient production in order to achieve a balance between the environment and the economy.

Therefore, we have divided the discussion into 4 sections: **"Processing Methods"**, **"Material Handling & Storage"**, **"Space Classification,"** & **"Resource Allocation"**.

Processing Methods

Choosing the right processing method significantly impacts the subsequent lifespan of the material, with **'service life'** being a key factor.

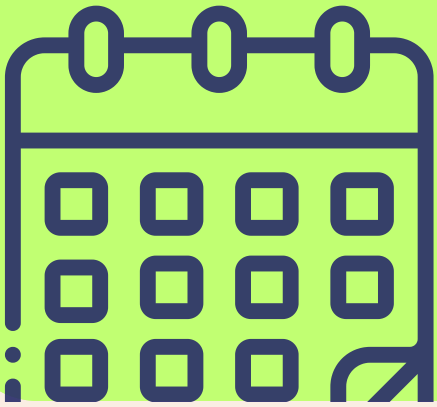
Short-term use



Current practices often involve productions that run for only a week or one-time events, leading to products designed for single use, which are less resource-efficient.

In such cases, a 'processing method for short-term use' should be adopted to optimize production.

Long-term use



Tour: Multi-Purpose Products

When creating products for long-term use, excessive emphasis on reworking ready-made items or using waste materials can result in products that lack durability or are difficult to store. Instead, consider adopting ‘processing methods’ specifically designed to enhance longevity and practicality.

HOW DO I DETERMINE "LONG-TERM USE" OR "SHORT-TERM USE"?

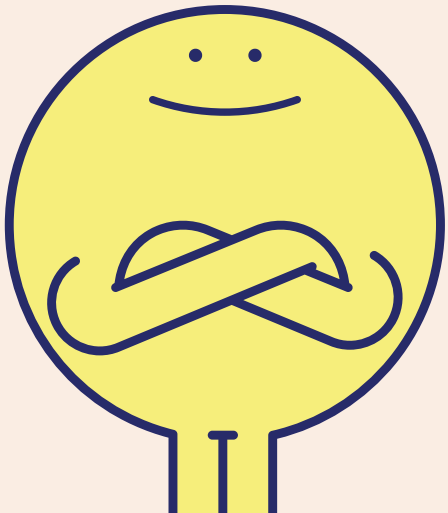
Not every show starts with the certainty of successfully going on tour. If you're unsure whether the product will continue to be used in the show in the future, you can make an assessment using the following approach:

Versatility

Can the product be repurposed for other performances, exhibitions, educational activities, or rentals ?
Versatile items, such as neutral tables, chairs, and puppeteers' costumes, are ideal for long-term use due to their adaptability.

Convenience of storage

Is it easy to store ? Items that are difficult to store are more prone to damage or disposal, making them only suitable for short-term use.



PROCESSING METHOD FOR SHORT-TERM USE



PROCESSING METHOD FOR SHORT-TERM USE

1. Zero processing

Utilize ready-made products, such as selecting a suitably sized puppet from the existing inventory.

2. Processing ready-made products

Modify ready-made products in a reversible manner, such as extending a puppet's control rod.

3. Restorable processing

Use alternatives like pins, needles, and ropes instead of adhesive glues to minimize wear and tear, preserving the materials for easier restoration.

4. Reusable processing

Avoid applying glue over large areas to preserve the material and enhance its potential for future reuse.

5. Recyclable processing

Use single materials to prevent damage to recyclable materials. For example, avoid using spray paint or oil-based paints, as they can compromise the recyclability of paper and plastic.

If composite recyclable materials are used, make sure that the processing methods allowed for easy disassembly.

Alternatively, repurpose waste materials with no recycling value, giving them a second life before eventual disposal.

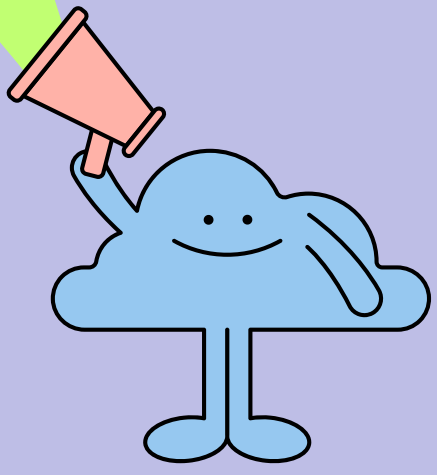


Useful reminders

- Consider the ease of disassembling a product, as items that are too challenging to take apart are often discarded when time is limited.

- What materials can be recycled ?
  Please refer to "**8. Retirement**".

- When establishing guidelines, involve team members in discussions to develop a standard that everyone is willing to follow. During implementation, discrepancies between the ideal and reality may arise—for instance, processing materials might take too much time, delaying production, or the chosen method may significantly differ from established habits, making it challenging to adopt. Such challenges are normal. It is essential to **remain flexible**, **foster ongoing communication**, **and make adjustments** to find suitable criteria that leverage everyone's skills. This approach helps avoid stifling creativity and patience due to overly rigid restrictions.



PROCESSING METHODS FOR LONG-TERM USE

When considering future use scenarios,
the following factors should be taken into account:

1. Repair and cleaning

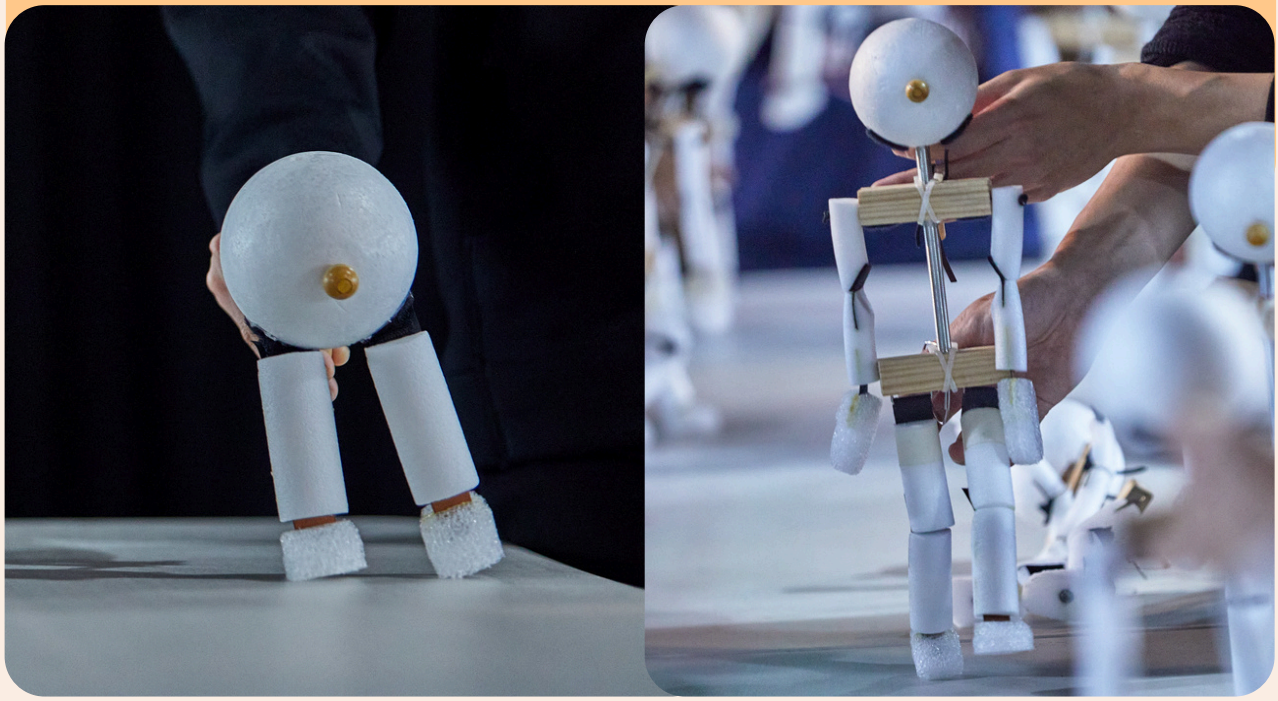
- Is it easy to repair and clean ?
  Ensuring maintenance access simplifies the replacement of worn-out parts and prolongs the product's usability.
- Maintenance management should be factored into the production budget, as it plays a crucial role in extending the product's service life.

2. Storage

- Proper storage not only prevents damage but also reduces storage and transportation costs.
- When structural strength and disassembly time permit, breaking the product down into long branches or flat pieces can facilitate easier storage.
- Using reusable packaging instead of bubble wrap can save packing time and reduce waste.

3. Modularization

Standardizing the specifications of commonly used products allows them to be shared across projects, enhancing efficiency and reducing costs.



THE EFFECTS OF MODULAR DESIGN

This is particularly effective when modular design incorporates a set of standard operating procedures (SOP). For example:

1. Standardized parts

Using standardized platforms, scenery pieces, and staircases as foundations can significantly reduce the workload in stage production.

2. Design with consistent sizes

Simplifying the variety of materials and parts can lower purchasing and storage costs while minimizing the time spent on repetitive sizing during production.

3. Easy disassembly and reuse

Standardized design facilitates easy disassembly and reuse of products after their retirement.
For example, the skeleton structure of a retired puppet can be repurposed to create a new puppet.

4. Efficient storage

Modular design enables the development of tailored storage solutions, optimizing space and reducing storage planning costs.

CONSIDERATIONS FOR MODULAR DESIGN

Planning an effective modular design is a complex task that demands a thorough understanding of production, usage, and storage requirements to accurately determine the appropriate sizes and specifications. **It requires significant investment of time and money, along with extensive expertise and experience to develop successfully**. However, if the modular design cannot be sustained over time, it may end up consuming more resources than traditional production methods.

Additionally, disassembling and reusing products can incur other costs. For instance, breaking down and reusing a stage often requires more skilled technicians, **increasing the need for personnel, communication, and working hours**.
These hidden costs are easily overlooked but can significantly impact the overall budget.

CASE STUDY



[Standardized Scenery]
The Department of Theatrical Design & Technology at Taipei National University of the Arts
maintains a warehouse stocked with fixed-size scenery pieces that can be combined and reused. Each year, students create new scenery pieces as part of their coursework.
Over time, damaged pieces are repurposed by cutting them into different sizes for use in other projects, ensuring minimal waste and maximum resource efficiency.

[Standardized Show Program]

Story Works uses the same program design for each play. The advantages include:



1. Easy storage

Working with the same printing company enables standardization of the box specifications they provide, making stacking and storage more convenient. Additionally, storage cabinets for the programs can be designed to accommodate these standardized dimensions, optimizing storage efficiency.

2. Attracting viewers to collect

A standardized program enhances brand recognition and boosts audience interest in collecting the materials.

[Standardized Show Program]



3. Packaging material recycling

Used boxes can be disassembled and returned to the manufacturer for reuse in future shipments, helping to reduce waste.

4. Establishing Standard Operating Procedures

A clear workflow, from program design to printing, streamlines the process, reducing execution costs and saving time.

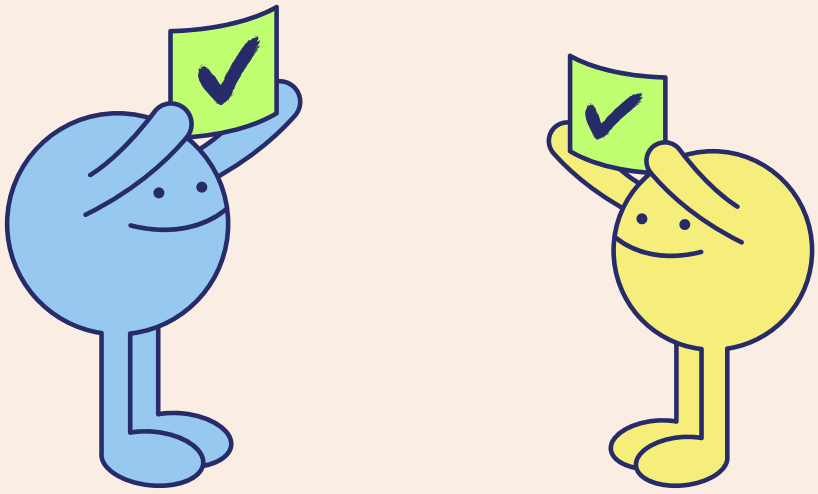
OTHER CONSIDERATIONS OF PROCESSING METHODS

In addition to service life, the amount of waste generated during production is an important factor to consider. For example, when making puppet heads, **the 【carving】 method generates more waste, whereas the 【construction】 method produces less.** Additionally, 3D printing is a viable option that can further minimize waste.

SUPERVISION OF PRODUCTION PROCESS

Even if experimental rehearsal mockups confirm that the designed product meets usage requirements, the final product may still fall short due to misinterpretation of the design or unforeseen changes in the creative process.

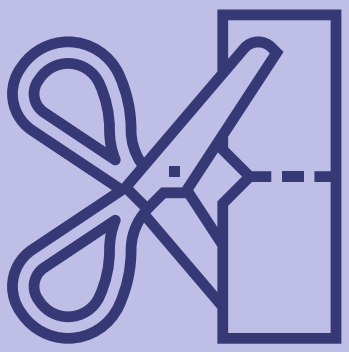
Therefore, regular monitoring and checks should be conducted to ensure that the current progress aligns with the product design, preventing waste caused by errors.



Material Storage & Reuse

Utilizing recycled materials from production waste and retired items not only reduces waste but also helps save budgets. However, without proper organization, this practice can result in a cluttered production environment and hinder the effective use of resources. To address this, it is essential to establish clear principles for the "handling" and "storage" of materials.

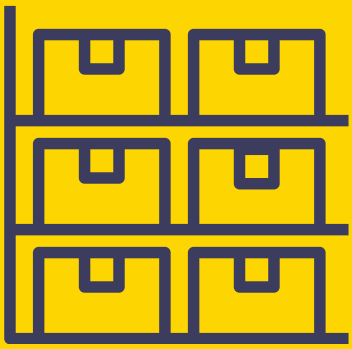
Material Handling



The purpose is to handle the material in a state that makes it **easy to use**.

- ☑ **Ready for immediate use**
- ☑ **Easy storage**
- ☑ **Being mindful of organizing costs**

Material storage



The goal is to keep the storage space neat and tidy so that you can **quickly find the materials you need.**

- ☑ **Establishing keep/discard criteria**
- ☑ **Material sorting**
- ☑ **Limiting the storage capacity**
- ☑ **Clear labeling**

MATERIAL HANDLING

Ready for immediate use

If recycled material requires reprocessing before use, the likelihood of it being utilized decreases significantly. Therefore, any foreign objects on the material should be removed in advance to streamline its reuse.

Easy storage

The shape of the material should be adjusted to prevent it from occupying excessive space or causing confusion. For instance, irregularly shaped panels that may become intertwined should be trimmed, and wires prone to tangling should be packaged separately for easier storage and handling.

Being mindful of organizing costs

Focus on the most essential and effective material handling, such as removing screws from lumber, while avoiding unnecessary tasks like over-cleaning residual adhesives or pigments that do not affect usability.

MATERIAL STORAGE

Establishing leave/discard criteria

Establish clear criteria for material retention, such as size and condition, to prevent the accumulation of unnecessary or unusable materials.

Material sorting

Store old and new materials separately, organized by type and size. Encourage users to prioritize using older and smaller materials first to minimize waste and maximize resource efficiency.

Limiting the storage capacity

Set a storage capacity that suits the workspace for storing small and medium-sized material pieces left after cutting. Implement a filtering mechanism when the capacity is exceeded to prevent over-stacking and maintain an organized, clutter-free space.

Clear labeling

Materials should be clearly labeled to ensure they can be easily located and returned to their designated storage areas.

CASE STUDY



Classification by size

Classification by old or new

Place used screws at the front of the drawer and new screws at the back to encourage users to prioritize using the older materials first.





Wood disposal standards for Wood Shop

Establish storage regulations tailored to the available storage space and the users usage habits to ensure efficiency and organization.

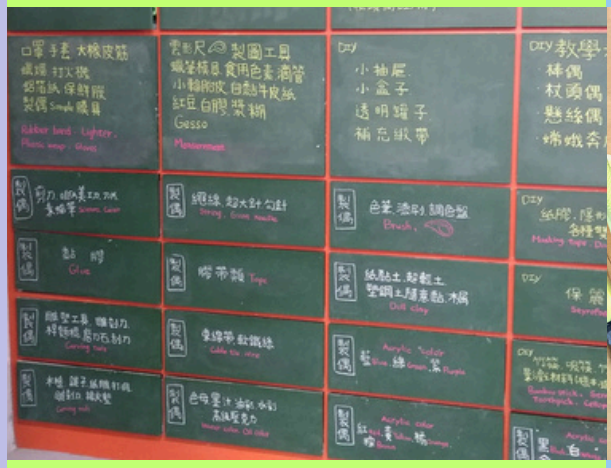
CASE STUDY





Various types of items
Materials can be organized by type and designated storage areas to minimize search time and improve efficiency.

Recycling of various types of foam
Handle materials to ensure they are easy to pick up and do not get entangled or hooked onto other materials, facilitating smooth access and usage.





A variety of tools and materials
They should include easy-to-adjust labeling and color-coded sorting aids to enhance organization and accessibility.

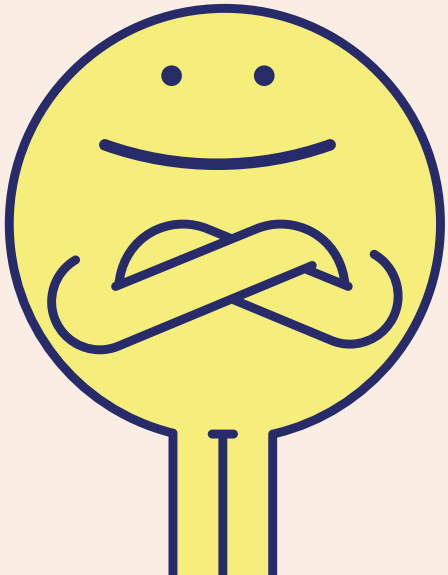
Intuitive storage labels
An illustrated wall of tools provides a clear visual guide, making it easy to know where each tool belongs without the need for verbal instructions.

REVIEW THE METHODS FOR MATERIAL HANDLING AND STORAGE

These guidelines must be clearly communicated and adhered to by all users. If implementation proves ineffective, the following principles can be reviewed:

A Is everyone fully aware of these guidelines ?

B If a rule has been communicated but is not being followed, it could be because the rule is not practical enough or because staff lack sufficient time to enforce it.



Space Management

A common challenge in working spaces is the mixing of finished products, semi-finished products, leftover materials, and tools, especially when multiple projects are being carried out simultaneously. This often leads to a cluttered workspace and reduced efficiency.

To address this issue,
the following process has been adopted:



Take the Puppet & Its Double's puppet-making space as an example

Identify Common Problems

1. Tools and materials are often left in random piles, creating uncertainty about whether they will be used again.

2. Worktables overflowing with clutter lead to a lack of adequate workspace.



Even when everyone has developed good working habits, these problems tend to recur repeatedly.

Two causes are identified after analysis

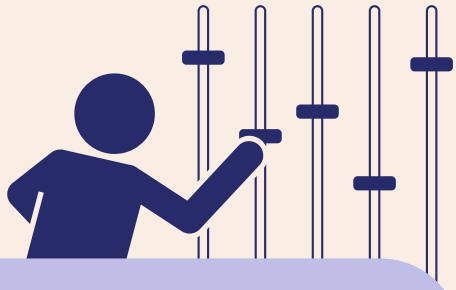
1. Lack of space for personal tool storage

Tools should be accessed from designated public areas, as keeping a large number of tools on desks consumes valuable workspace.

2. Unclear use of space

In addition to desktops, the lack of proper storage areas for semi-finished products, materials in use, and items returned from performances leads to disorganization and confusion.





Solutions

1. Tool cart

Storing personal tools in a cart minimizes the time spent retrieving them and helps keep the desk organized.

2. Project-based basket and cabinet

Used for storing ongoing projects, each basket is labeled with the project name, the person responsible, and the project duration, making it easier to manage and promptly dispose of unused items.

3. Temporary storage area

Designate a desktop as a temporary storage area for items awaiting organization after the show. Clearly label each item with the project name, the person responsible, and the storage duration to ensure they are addressed by the due date.







Take the Puppet & Its Double's puppet-making space as an example

Actual practice

After a trial period, evaluate whether the solution improves work efficiency.
If it results in new issues, return to the 'Identifying Problems' section to reassess.



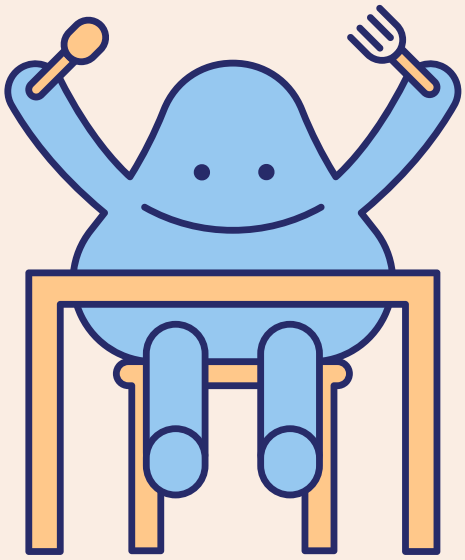
Resource allocation

Throughout the production process, we have thoroughly discussed various details regarding material usage and its impact on the environment.

However, overemphasizing environmental aspects while neglecting resource allocation can strain the distribution of manpower, time, and budget, ultimately constraining the production process and disrupting the balance between environmental considerations and practical needs.

Taking resource allocation into account can shift the mindset and broaden the vision of design.

The following outlines Ridge Studio's thought process for sustainable resource allocation.



Sustainable resource allocation mindset

Assume a production with a stage budget of NTD 350,000

Typical allocation



STAGE Production Fees — **300K**

STAGE Design Fees — **50K**



Designers often need to juggle multiple projects simultaneously to sustain their livelihood, which limits the time and resources they can dedicate to each project, frequently leading to budget overruns.

Adjusted allocation



STAGE Production Fees — **250K**

STAGE Design Fees — **100K**



Engage with designers and encourage them to dedicate more time to sourcing second-hand materials. This approach reallocates resources toward human labor and time, enhances focus and efficiency, reduces material waste, and decreases the risk of exceeding the budget.

Examine the misuse of resources in the project

In the Puppet & Its Double's puppet-making environment, crafting handmade puppets can result in significant time consumption. Consequently, the time and labor invested in each puppet were analyzed, revealing the following phenomena:

Differences of hours spent on making puppets

Two puppets, A and B, are similar in size, yet creating puppet A takes twice as long as puppet B. This discrepancy arises from the different processing methods used for each.
Consequently, we reassessed the advantages of these two methods.

The following are possible scenarios:

- A performs exceptionally well ➜ Despite being time-consuming, it is considered acceptable.
- The performance of A is not significantly different from that of B ➜ Explore alternative options.
- A's method cannot be avoided, but more efficient approaches are sought ➜ Investigate less labor-intensive ways to achieve comparable results."

Avoid habitual thinking and make more rational decisions through systematic, step-by-step discussions.

EXAMINE THE MISUSE OF RESOURCES IN THE PROJECT



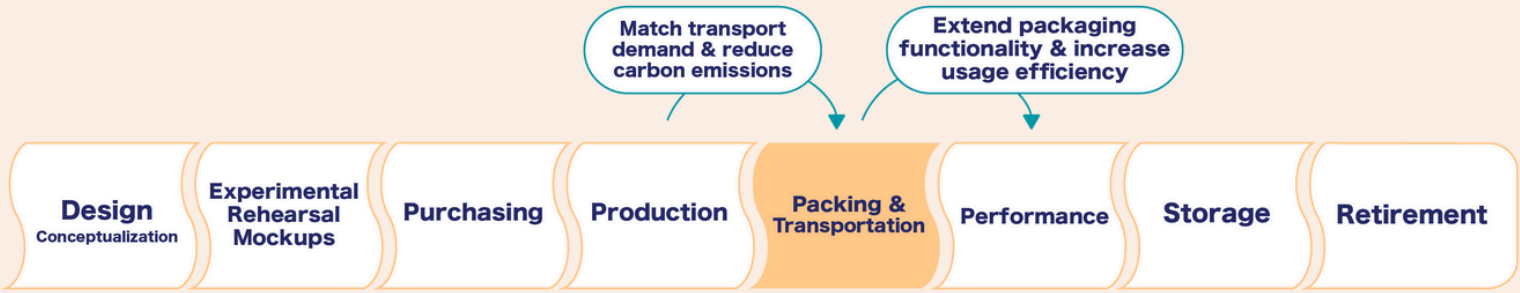
2. Identify labor allocation problems

Data analysis reveals that the most efficient puppet maker actually spends less time crafting puppets.

Upon further investigation, it was found that this puppet maker dedicates significant time to sourcing materials and mentoring assistants. Despite the increased number of assistants the overall efficiency is reduced."

Adjustment of strategy :
Hire an appropriate number of assistants and develop a structured plan for training new builders.

✳ Packing & Transportation ✳



During the transportation stage,
coordination with other departments can streamline logistics.

For instance, if you plan to use a vehicle to deliver a puppet to the theater, consider checking with other departments to see if they have items that also need transportation along the route.

This approach helps reduce carbon emissions and saves on transportation costs.

Minimizing **carbon emissions** and costs during the packing stage is essential by maximizing the use of available space. Throughout the processes of packing, transporting, loading, and unpacking, efforts should focus on **saving time and labor while reducing waste from packaging materials.**

Designing packing for subsequent use can enhance efficiency. Here are some examples of how packing and transportation can contribute:

1. Reusable packaging

Using cloth cushioning bags tailored to the size of the puppets simplifies the packing process by allowing the puppets to be placed in the bags and securely tied. In contrast, bubble wrap requires more time for wrapping and taping and generates a greater amount of waste.



Additionally, labeling the bag with the puppet's name and origin, along with attaching a photo, enables administrators and users to quickly identify and manage the puppets.

2. Saving packaging materials



When transporting large, lightweight items, **hooks and ropes can be used to create flexible compartments** within the box. These compartments prevent collisions and crushing of the items while significantly reducing the need for additional packaging materials.

3. Standardized packaging size



Story Works's equipment storage containers

Selecting containers with uniform length and width that can be stacked enhances the efficient use of transportation and storage space. Containers of varying heights can be chosen based on specific needs. Aligning the container sizes with the dimensions of the truck minimizes labor during transportation and further improves overall efficiency.

4. Funtionality of packaging

Rack cases, often used in theater, can be customized with various styles and features, such as adding drawers or altering their opening mechanisms. Designing the case with future use in mind can significantly reduce the time required to access and organize items inside.



Take Story Works's rack cases for example:

By combining storage and costume room functionality, the rack case is equipped with hanging rods, dressing mirrors, separate storage compartments, and double doors. This design maximizes space utilization and transforms the case into a **'mobile costume room'** when opened.

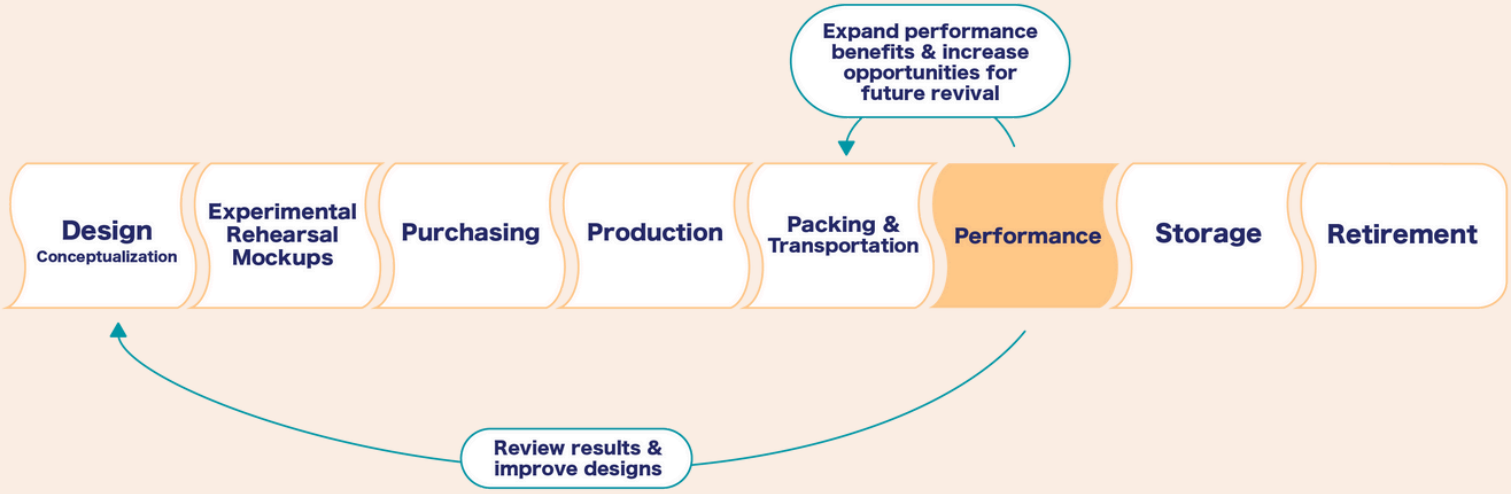
PACKING STRATEGY

Take *Story Works's* walkie-talkies storage for example:
Integrating storage and a charging station for walkie-talkies allows for easy charging by simply plugging the power supply into the charging box. This streamlined setup reduces the risk of forgetting to charge the walkie-talkies or encountering a shortage of chargers.



Notes on customizing rack cases:
For new productions, since the required items are still being adjusted, the packaging method should remain flexible to accommodate changes.
Existing boxes can serve as the primary solution.
It is advisable to wait until the production's needs are finalized before ordering custom cases,
thereby minimizing waste from inconsistent usage.

* Performance *



The performance stage provides an **excellent opportunity to evaluate the outcomes of sustainability efforts**.
It is a time to appreciate the completed work, observe the audience's reactions to the play, and assess how effectively the initial design was adapted to align with sustainability principles. Does sustainability act as a constraint or a catalyst for creativity ? Continue reflecting on how to achieve the optimal balance between artistic creation and sustainable practices."

This stage is **the most valuable part of the production process** and the main purpose of the production.

Each performance generates carbon emissions through transportation, crew travel, setup, and breakdown activities. Therefore, it is crucial to maximize the impact of each performance and extend the service life of resources to promote sustainability.

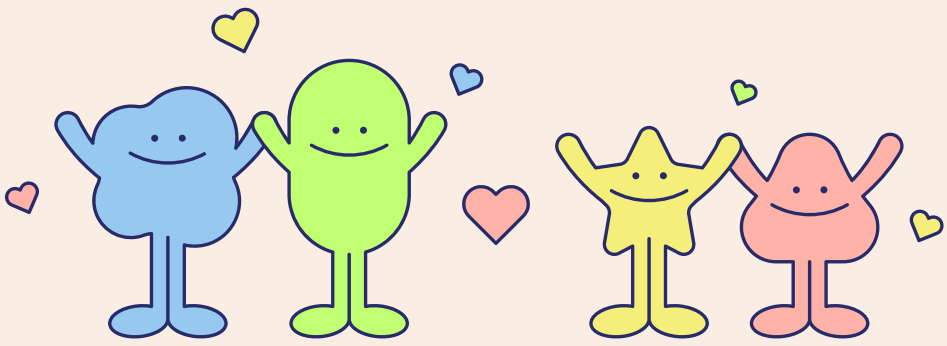
ENHANCING THE SUSTAINABILITY OF PERFORMANCES

As setup and travel costs rise, particularly for large-scale productions and international performances, it becomes essential to carefully consider ways to enhance efficiency.
Below are some suggested approaches:

1. Reaching out to a wider audience

Increasing the number of performances
Increase the number of performances to fully utilize the already-built stage and technical equipment, thereby reducing resource consumption and carbon emissions per performance.

Touring
Extend the service life of performance resources by increasing touring opportunities, thereby distributing the carbon footprint of travel across multiple shows while broadening the impact.



2. Hosting side events

- **Talkbacks**

By fostering interaction between the creative team and the audience, performances can not only spark creative exchanges but also promote the sustainability of theater, thereby amplifying its social and cultural impact.

- **Workshops & educational activities**

These events provide an opportunity to extend the theater piece into various aspects of life and engage individuals who have never experienced theater before.
For instance, organizing workshops and educational activities aligned with the performance themes can foster a two-way dialogue, allowing for the exchange of ideas and perspectives.

EMERGENCY PURCHASES OR PRODUCTIONS DURING THE "PERFORMANCE" STAGE

During the performance stage, there may be instances where the outcomes fall short of expectations, requiring urgent adjustments to be made.

Such contingencies, which often demand substantial resources and expenses within a short timeframe, can be managed by implementing the following countermeasures:

Reevaluation of the need
Review the necessity of the adjustment to determine whether re-purchasing or creating a new item is truly required.

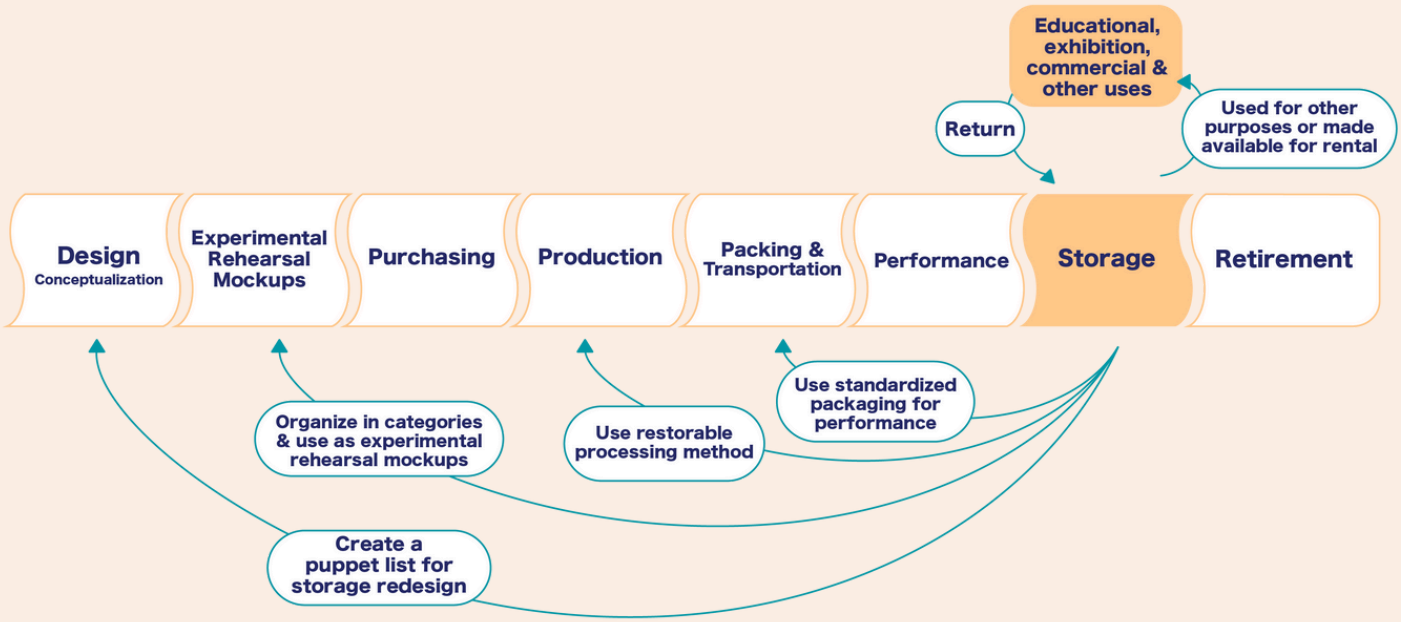
Cross-departmental collaboration
Encourage collaboration among departments to leverage existing resources and expertise, identifying the most effective and resource-efficient solution to address the situation.

REMINDERS FOR THE USE OF PRODUCTS IN THE "PERFORMANCE" STAGE

- Before performances and rehearsals, clear guidelines on the proper use of items should be communicated, including rules for the placement and handling of puppets. Items prone to damage or potential hazards from improper use should be clearly labeled to ensure their longevity and safe utilization."

- During the 'production' stage, maintenance methods can be applied in emergencies.
  Therefore, it is essential to prepare appropriate repair tools during the 'packing and transportation' stage to enable early repairs and prevent further damage to the product.

Storage



After the show, prolonged storage of unused products diminishes their value while increasing storage costs. Revisiting the 'puppet value chain' enables opportunities for reuse, ensuring the product's value is preserved without causing damage.

CASE STUDY



The Department of Theatrical Design & Technology at Taipei National University of the Arts
has created a catalog of highly versatile large and small props, allowing for reuse across different student classes.

FROM "STORAGE" BACK TO "DESIGN CONCEPTUALIZATION"

During the conceptualization stage of a new production, having a clear understanding of available resources allows creators and designers to maximize the reuse of stored items.

An inventory of all puppets, props, stage sets, and costumes should be created to facilitate the identification and utilization of available resources.

However, creating and maintaining an inventory can be challenging, as it is time-consuming and may become outdated without regular updates.

Reminder

When inventory items are borrowed for various projects, updating the inventory becomes more complex, often raising uncertainty about whether to categorize the items under new or original projects. It is recommended to retain the name of the original project, while subsequent projects should be labeled to indicate the source project from which the items were borrowed.

FROM "STORAGE" BACK TO "DESIGN CONCEPTUALIZATION"

Story Works maintains a detailed inventory of props, set pieces, and costumes, enabling designers to easily select and reuse items. This practice is both environmentally friendly and cost-effective. Additionally, Story Works offers an efficient management tool to streamline the inventory creation process.

Basic information needed to establish the inventory:
Includes details such as a photo, size, and the title of the production.

The 'Photo' and 'Size' assist creators in assessing the item's suitability, while the 'Title' aids in quickly locating the item.

Timeline for inventory updates
Integrate inventory creation into the workflow by updating it during the closing and filing process after a performance, and establish a clear deadline for its completion.

Reminder

As the time required to create the inventory increases with the number of items recorded, it is important to tailor the inventory contents to specific needs, avoiding unnecessary details to save time.

POSSIBILITIES FOR STORAGE MANAGEMENT

To maximize the value of 'storage,' we can explore opportunities to use stored items within our own operations. For instance, beyond performances, Puppet & Its Double also organizes 'educational outreach events,' 'exhibitions,' and 'commercial performances.' Storage is categorized as follows:

Experimental rehearsal Mockups

Store highly versatile items, such as tabletop puppets and platform benches, in easily accessible locations to serve as substitutes during rehearsals.

For educational space

Durable and easy-to-operate puppets are ideal for teaching demonstrations, interactive activities, or student use.

For exhibitions and commercial events

Visually striking and unique puppets are well-suited for exhibitions and commercial events.

For external rental

Items available for rental to other teams or sectors, such as puppets for video shoots, teaching, and community engagement events, or stage props for exhibition decoration and immersive space design, can extend their utility and generate additional value.

The Puppet & Its Double's Puppet Archive

	飛船與海怪	章魚	動物	穿戴偶-單人	B8	80長 x 50寬 x 170高
	飛船與海怪	鰻魚	動物	穿戴偶-單人	B8	200長 x 50寬 x 170高
	鯨之嶋	小火伴 x 4	動物	穿戴偶-單人	B7 - 2F	100長 x 70寬 x 165高
	鯨之嶋	小鯤	神仙	杖頭偶	B7 - 2F	70長 x 40寬 x 120高

REUSE THE PUPPETS FROM REPERTOIRE

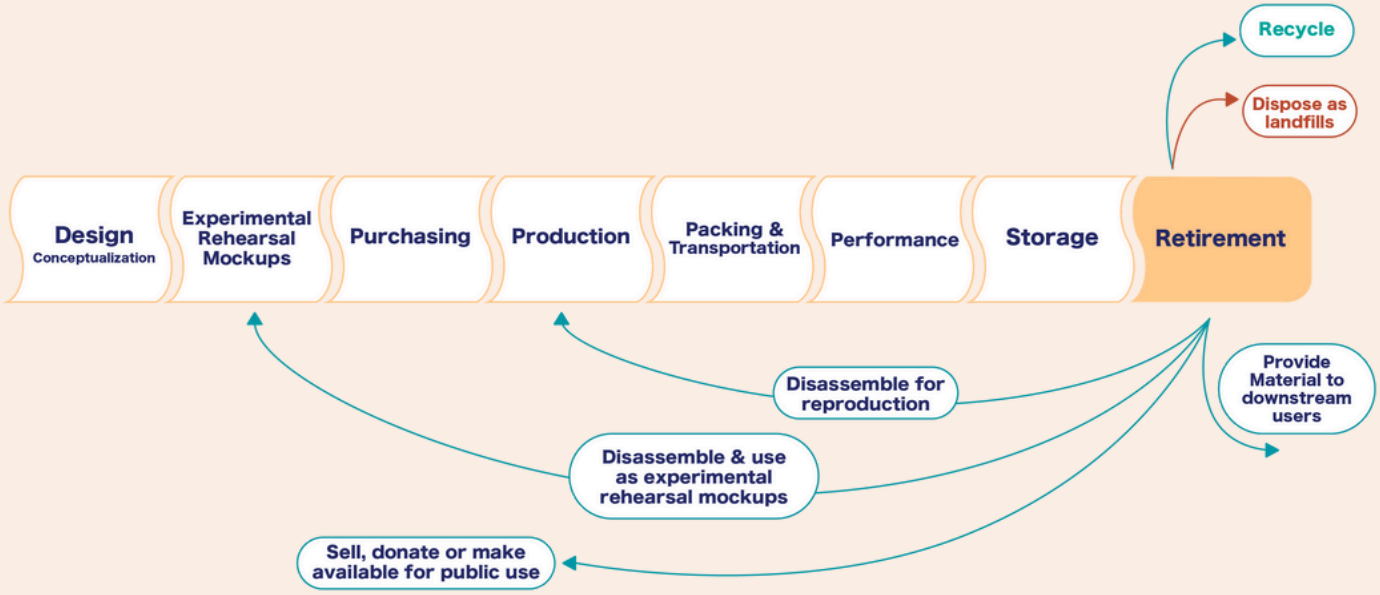
2024 *Ocean Swirl : Journey of Kun*

Taiwan Lantern Festival in Tainan x Puppet & Its Double



Aside from the newly built KUN puppet, other marine creature puppets were refurbished and creatively repurposed from the productions ***2020 Flying Ship & Sea Monsters*** and ***2023 Whale Island***, following an art restoration process.

* Retirement *



When a puppet, prop, or stage element is deemed no longer usable, it transitions to the 'retirement' stage.

During this stage,
irreversible disassembly, modification, or destruction of the item is permitted to fully **maximize its potential.**

- Items can be processed or transformed into puppets for new productions.
- Items can be designated as rehearsal substitute puppets, with the potential for future transformation.
- Items can be sold or donated to organizations in need.
- Items can be made available for modification and renewal by other creators, provided there is thorough communication.

Disassembly is the preferred option when a product has no other suitable use or is in poor condition.
The efficiency of the disassembly process depends significantly on how the item was constructed during the 'production' stage.

CASE STUDY





The mango trees from the production ***2019 My Mother Needs An Education*** were repurposed into orange trees after retirement, becoming props for elementary school students' performances."

Retired production can be disassembled into

1. Useful parts

Control rods, skeleton structures, or hardware can be disassembled and repurposed for use in new productions.

2. Complete material

Materials in good condition can be returned to the material inventory for future use.

3. Fragmented materials

Identify suitable downstream users; for example, materials too small for puppet-making may still be valuable in the crafts or stop-motion animation industry.

4. Disposal

Materials with recycling value should be properly recycled, while those without recycling potential will be incinerated or disposed of in landfills.

Tools

Recycling standards differ by region. It's helpful to create a list of commonly encountered waste materials and consult your local sanitation team for proper disposal guidelines.

What can be recycled ? How to recycle ?

https://recycle.rethinktw.org/blog/

Disposal of materials

Material	Disposal
Waxed kraft papers & gloss posters	**Paper**
Release papers	**landfill**
Papers with acrylic paints or wax-based crayon paints	**landfill**
Papers with water-based paints or inks	**Paper** Must be marked as non-polluting and recyclable
PE foams & Polypropylene plastic sheets	**Plastics** Require separate collection and recycling
Styrofoam & foam boards	**Plastics** No residue or dust is allowed. Due to its large size, it takes up space in the recycling truck and is often rejected.
Woods & bamboos	**Furnishing Waste** Only a small amount can be thrown away as garbage. When the amount is large, transportation costs are required.
Blades	**Iron/Aluminum** Need to be individually packed and labeled.
Aerosol spray bottles (metal cans containing gas, such as spray paint cans, hairspray cans, insecticides, WD40, etc.)	**Iron (not aluminum)** **Must first be emptied:** To ensure complete venting to prevent injuring sanitation staff or equipment during the recycling process, empty the can by spraying it upside down, then punch a hole with a tool in an open, well-ventilated area.

Chapter 3
Conclusion

Conclusion

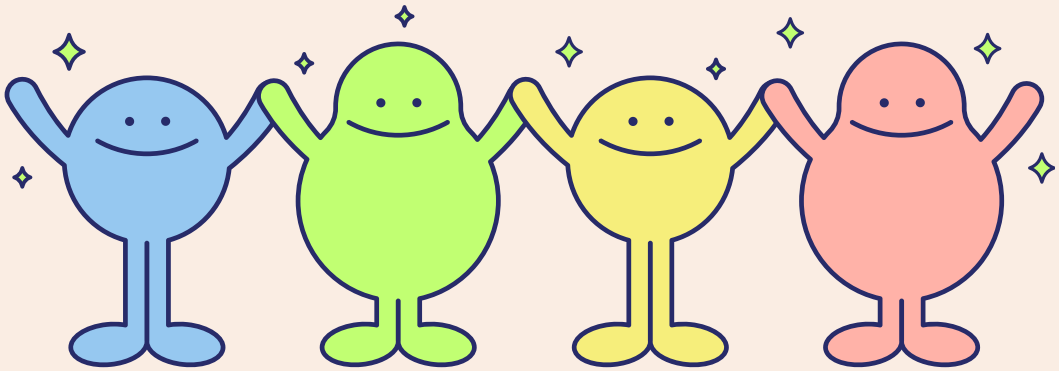
We have compiled this guide using existing resources and welcome feedback from others to incorporate their experiences and insights, making the content more comprehensive and practical.

In this journey toward sustainability, we recognize that it cannot be achieved instantly but requires a solid foundation of knowledge, a clear understanding of sustainable principles, and thoughtful planning from the very inception of creation.

Much of the advance planning and consideration required for sustainability aligns with the work habits essential to theaters. The effort to reduce the carbon footprint echoes the drive to minimize costs and expenses in theater productions.

In theater, when an idea doesn't work, we explore other approaches rather than giving up; the same principle applies to sustainability. Embracing failures in the process, maintaining a flexible mindset, and letting go of old habits are essential to discovering new possibilities, even when constrained by time and budget pressures. Achieving sustainability and fostering creativity requires extensive communication and continuous adjustments, much like how theater thrives on exploring boundless possibilities within its inherent limitations.

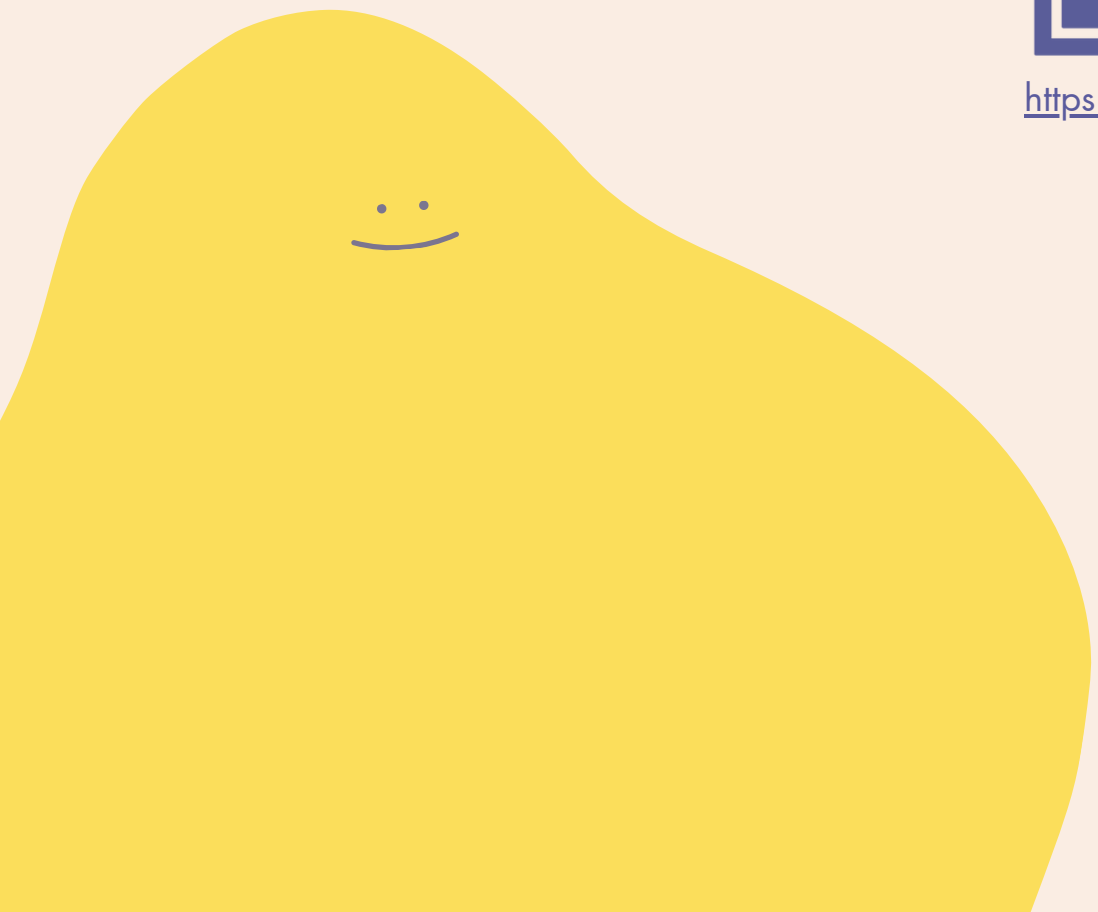
Remember, the true power of theater lies in the impact it has on its audience. Leverage your strengths, discover a sustainable approach that works for you, and **strive to maximize positive impact while minimizing negative effects**.
By doing so, we believe it is possible to create meaningful change in both theater and the environment.



Feedback

We have provided a feedback form and warmly invite everyone to share their thoughts and suggestions.
The Green Workshop Guide will be updated periodically, and we look forward to gathering your
valuable contributions to make it even better.

https://reurl.cc/jQR0jL





Chapter 4
Reference

Reference

BOOK

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ONLINE RESOURCE

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  https://www.tdri.org.tw/37211
- 【循環設計觀察系列*2*】開始循環設計的第一步：運用循環設計策略與指引工具. (2024 September 10). 台灣設計研究院.
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  https://theatregreenbook.com

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- 歐陽藹寧(2023.07.18)。永續生活的100種路徑
- 楊金源(2023.08.03)。北藝舞台製作的永續實踐
- 李怡霖(2023.08.09)。五結清潔隊回收講座
- 黃梓柔(2023.09.05)。與企業結合的管道
- 黃梓柔(2024.05.02)。溫室氣體盤查與碳足跡計算講座

Organizations that we visited and consulted (in the order of visit)

LeeWeiDesign, Director Wei-mu Lee
Offering extensive experience in talent development and the implementation of stage scenery modularization concepts.

Department of Theatrical Design & Technology
Taipei National University of the Arts (TNUA)
Associate Professor, Technical Director Chin-yuan Eugene Yang
Sharing insights on sustainability within educational environments and exploring the relationship between user habits and space utilization.

Ridge Studio, Co-founder Hao-chen Yuan
Sharing practical experiences from stage scenery sustainability to talent sustainability, along with reflections on sustainability practices in Taiwan.

Story Works, Executive Director Chia-Feng Lin
Offering the concept of modular production and storage, along with efficient management operations."

Reference

【參考圖示】

The inverted pyramid diagram in this guide is referenced from page 17 of the Theatre Green Book version 2.

https://theatregreenbook.com/wp-content/uploads/2024/03/TGB_v2.pdf



Is it worth harming the planet for?
為了這個，值得傷害地球嗎？

Appendix

COMPANIES THAT OFFER SECOND-HAND RESOURCE RENTAL

- **大岳藝術製作有限公司——Stage sets rental**
  https://artprm.wixsite.com/artprm/blank-5
  Addess: 新北市八里區老阡坑路4-28號
- **Ridge Studio Production & Design——Large and small props rental**
  https://www.facebook.com/ridgestudio.production.design
  Address: 北市北投區北投路一段9號3樓323室
- **華視電視公司-出租業務——Costumes, props and stage sets rental**
  https://www.cts.com.tw/about/rent/scene.html
- **閃亮亮戲劇服裝永續共生空間——Costumes**
  https://www.facebook.com/blingblingcscsp
  Address: 臺北市中山區南京東路一段132巷31號B1

Editor | Chia-yin Cheng & Helmi Fita
Staff Writer | Feng-Cheng Li & Meng-ru Yu
Visual Design | Beier Tang
Copy Editor | Pin-Chen Guo
Translator | Chee-Hann Wu

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Ridge Studio | Hao-chen Yuan
LeeWeiDesign | Wei-mu Lee & Chi-ting Kuo
Story Works | Chia-Feng Lin
Department of Theatrical Design & Technology, Taipei National University of the Arts | Chin-yuan Yang

没有不重要的一小步

Every Step Counts

