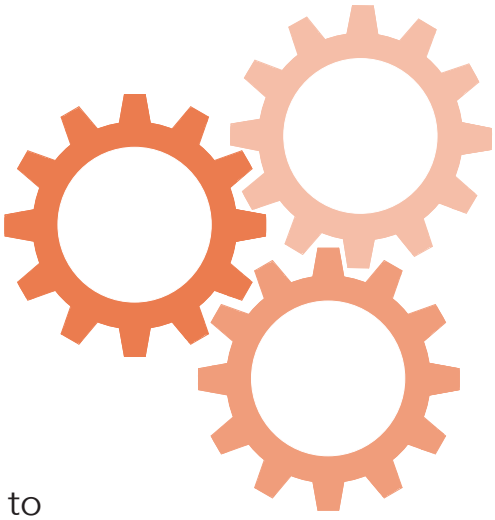


Smithsonian Exhibits Guide to

PROTOTYPING

Smithsonian
EXHIBITS
DEVELOP DESIGN BUILD

http://exhibits.si.edu

TABLE OF CONTENTS

PROTOTYPING BASICS

What is prototyping?

In the museum field, prototyping is an iterative process for developing, testing, and refining exhibit elements with audiences.

Why should I prototype?

Prototyping allows you test your ideas to see what works before investing time and money in a final product. The process adds value to exhibits, helps make them more effective and engaging for visitors, and saves time and money in the long run.

What types of exhibit elements can I prototype?

You can prototype almost any type of exhibit element. Exhibit elements that are commonly prototyped include:

- Mechanical interactives
- Digital interactives
- Tactile elements
- 3D models
- Graphics
- Exhibit titles and text

So many choices! Which elements should I choose?

When selecting which exhibit elements to prototype, SIE recommends prioritizing the elements that you consider most critical to successfully meeting your exhibit's visitor experience goals. Elements that are particularly complicated might also benefit from prototyping.

When should I start prototyping?

Prototyping should begin early in the exhibit development and design process. Ideally, prototyping should begin once the potential exhibit elements and their goals have been identified but before the design of the exhibit has been fully developed.

SIE recommends starting the prototyping process between the concept design phase (10%) and the schematic design phase (35%). It is important to build adequate time into the schedule to prototype and implement your findings.

How long does prototyping usually take?

Prototyping is an iterative process that can include several rounds of designing, building, testing, analyzing, and refining. Depending on the types of exhibit elements being prototyped, the project's schedule, and the number of rounds of testing, the prototyping process can take anywhere from two weeks to several months. Each project is unique, and a unique schedule will be created for each prototyping process.

How should I prepare for prototyping?

Establish your internal prototyping team early. Make sure your team includes the necessary stakeholders, such as curators, educators, and exhibit managers responsible for maintenance, etc., and make sure they understand their roles in the process.

If you're embarking on the creation of a new exhibit, it's a good idea to go through an interpretive master planning process to define your target audiences, visitor experience goals, big idea, key messages, critical questions, and interpretive strategies. SIE can provide help and guidance on this process for exhibits large and small.

It's important to approach the prototyping process with flexibility and an open mind. Be prepared for some ideas to fail and be ready to take chances. As the saying goes, "if at first you don't succeed, try, try again." This is an opportunity to test new ideas to see what works and what doesn't. By observing visitors and asking questions, we can learn how to make exhibit elements more effective.

THE PHASES OF PROTOTYPING

SIE breaks the prototyping process into two distinct phases:

1 **Conceptual Prototyping:**
The conceptual prototyping phase tests initial concepts to see if they are feasible and should be explored further. Conceptual prototyping can be fast, rough, and cheap. Testing in the conceptual prototyping phase may primarily involve sketches and low-tech, low-cost mock-ups. (Think cardboard and magic markers.) This part of the prototyping process is often called "rapid prototyping."

Conceptual prototyping tests the idea itself, not the specifics of its implementation. For exhibit titles and text, this might be the only phase of testing. The goal of this phase is to see how visitors react to the concept.

2 **Engineering Prototyping:**
The engineering prototyping phase focuses on how to design and build the exhibit element. Engineering prototyping tests specific materials and methods. Sometimes the engineering prototype will be used in the exhibit.

Key Questions to Answer During Prototyping

- Can visitors figure out how to use the exhibit element?
- Do visitors want to use it?
- Does it deliver the intended outcomes?
- Do visitors understand the key messages?
- Did visitors enjoy using it?
- Is the exhibit element accessible to all audiences? How could we make it easier to use?
- Is the exhibit element appropriate for the target audiences?
- Will the exhibit element hold up over time?
- How extensive do instructions need to be? Are the instructions part of the experience? (For example, if an interactive demonstrates a process, do the instructions and the interactive work together?)

1 A STEP-BY-STEP GUIDE TO PROTOTYPING

Before You Prototype

Interpretive Master Planning and/or Concept Design Phase

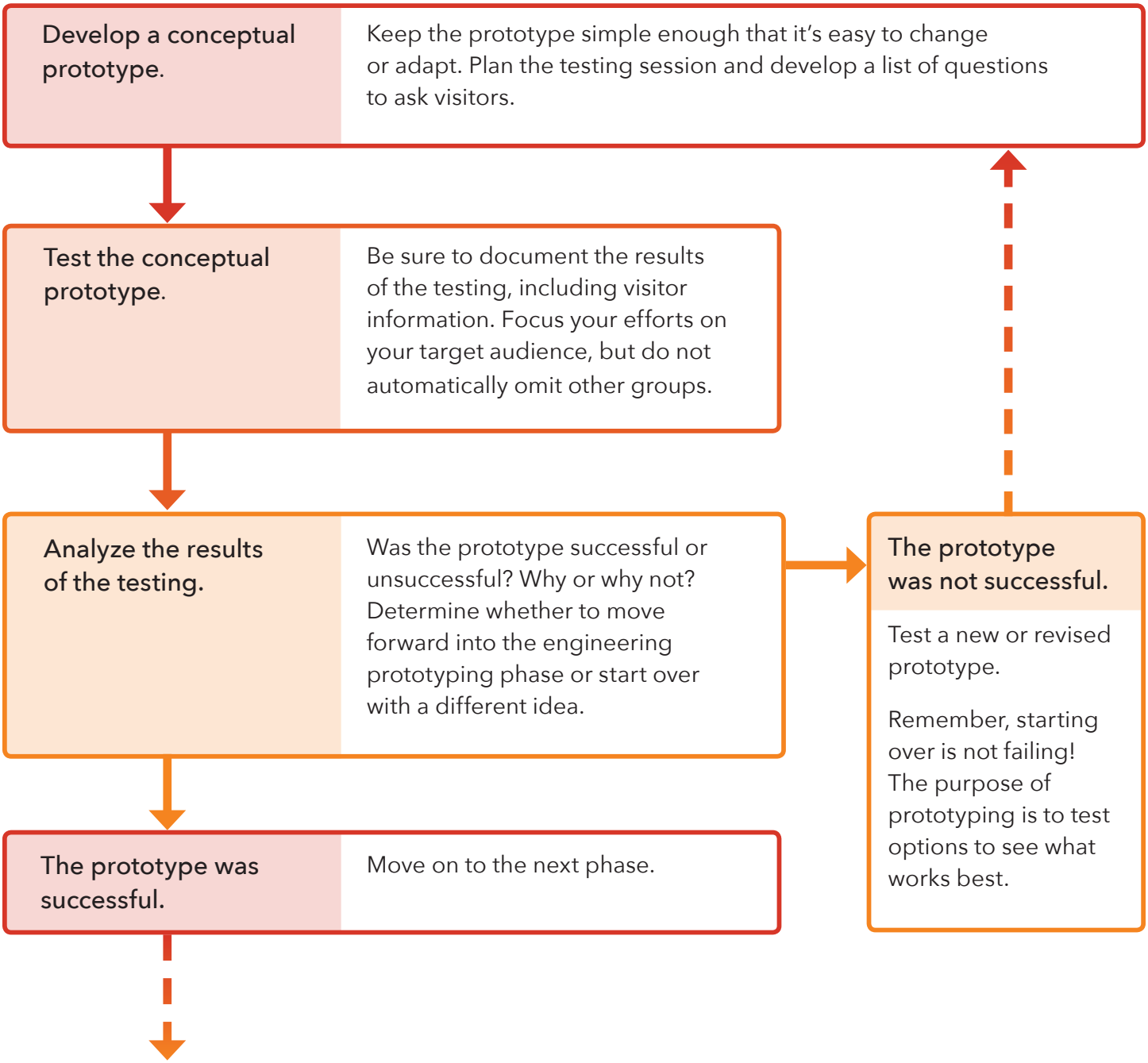
Determine your target audiences.	These are the audiences you need for successful testing.
Establish the exhibit's visitor experience goals and key messages.	What do you want visitors to do, see, hear, feel, etc.? What are the key points you want visitors to walk away with?
Select which exhibit elements to prototype.	It's good to start with multiple options to see what works best.

Once these items are determined, your team is ready to move on to the Conceptual Prototyping Phase.

2 A STEP-BY-STEP GUIDE TO PROTOTYPING

Conceptual Prototyping Phase

Consider working with a professional evaluator on this phase.



At the completion of this phase, your team is ready to move on to the Engineering Prototyping Phase or, if engineering is not required, on to the Design Development Phase.

3 A STEP-BY-STEP GUIDE TO PROTOTYPING

Engineering Prototyping Phase

Consider working with a professional evaluator on this phase.

Develop an engineering prototype based on the feedback from the first round of testing.	Keep the prototype simple enough that it's easy to change or adapt. Plan the testing session and come up with a list of questions to ask.
Test the engineering prototype.	Be sure to document the results of the testing, including visitor information. Focus your efforts on your target audience, but do not automatically omit other groups.
Assess the results of the testing.	Was the prototype successful or unsuccessful? Why or why not? Determine whether to refine the prototype further.
The prototype was successful.	Create the final exhibit element.
Review the process and lessons learned.	Use what you've learned to improve future prototyping exercises.

The prototype was not successful.

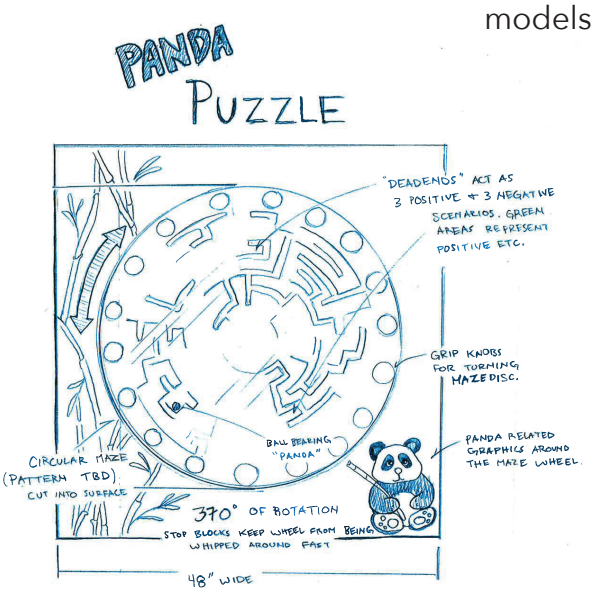
Try, try again!

Can you refine the current design or do you need to try another method entirely? Can you pinpoint the issue? Is the prototype too complex? Are visitors having trouble using it or learning from it? Are visitors getting the desired messages?

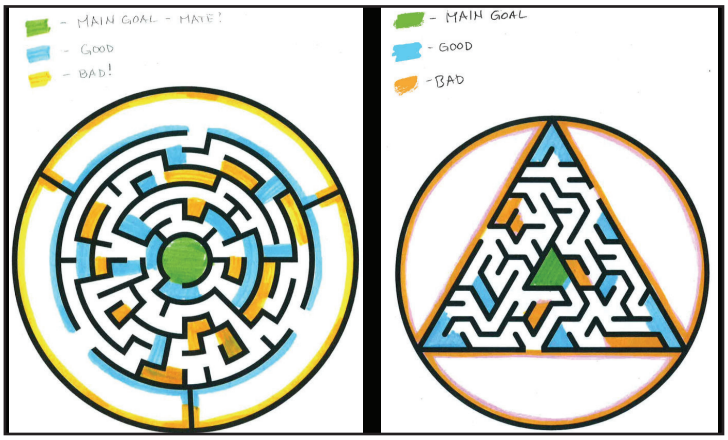
PROTOTYPING TOOLS

SIE uses multiple tools during the prototyping process, depending on what is needed during each phase. These tools include:

- Sketches and storyboards
- 3D computer models
- Physical models, which can range from rough cardboard models to professionally fabricated models

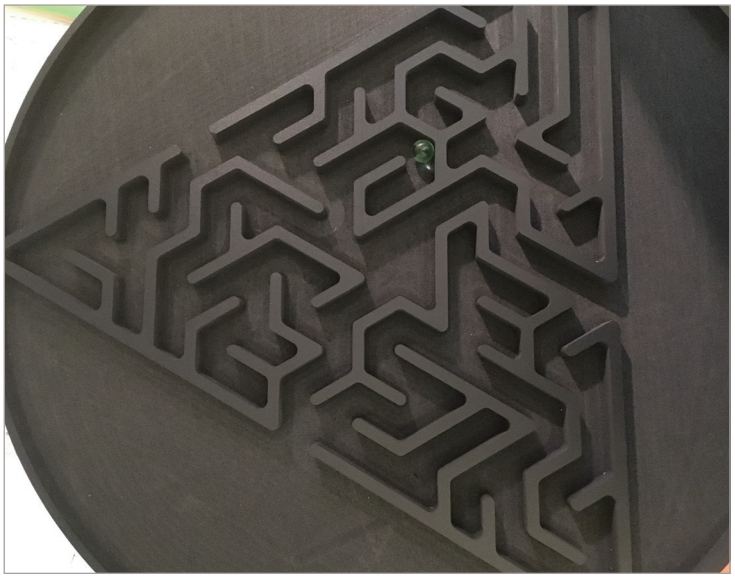


Initial concept sketch



Working sketches to refine the concept

3D computer model



Fabricated prototype component

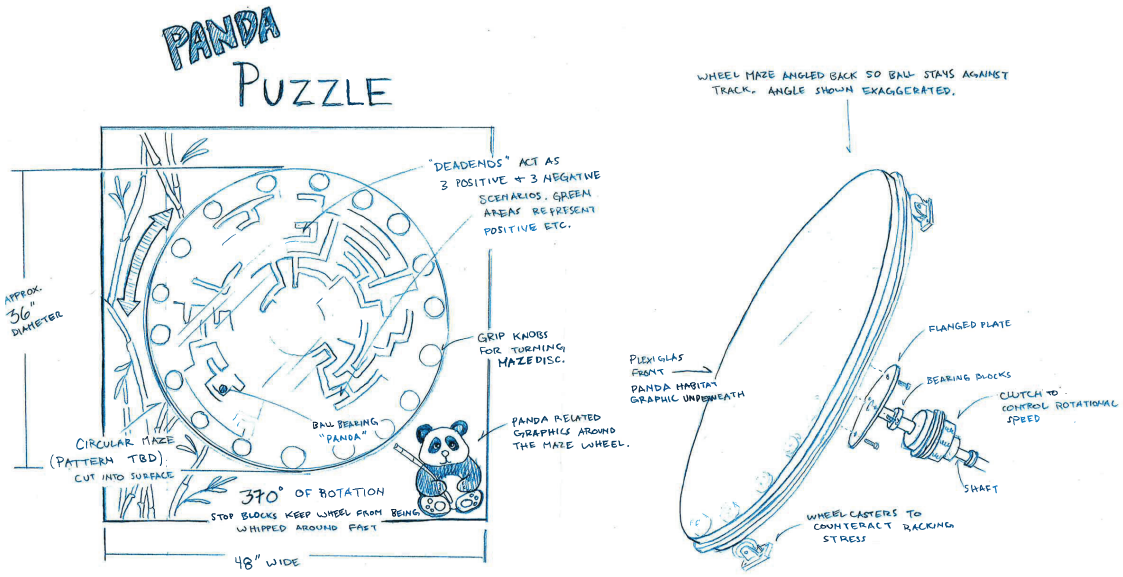
GLOSSARY OF TERMS

- **Digital interactive:** A computer-based exhibit element
- **Evaluator:** A professional who studies and measures visitors' responses to exhibit elements and whether they are meeting the desired goals. Evaluators conduct front-end, formative, and summative evaluation through focus groups, surveys, interviews, and visitor observation
- **Mechanical interactive:** An exhibit element that visitors can physically manipulate
- **Mock-up:** A sample model or printout of an exhibit element showing what it will look like
- **Prototype:** A preliminary form of an exhibit element, which is tested and refined to develop the final product
- **Prototyping:** An iterative process to test exhibit elements before implementing them
- **Rapid prototyping:** A type of prototyping focusing on concept testing; usually using easily available materials to make "cheap" prototypes that can be altered quickly and re-tested
- **Tactile elements:** Exhibit elements that visitors can touch
- **3D computer models:** 3D computer modeling is the cheapest and quickest way to iterate many different solutions and is shareable in many ways, including shop/design drawings, animations, renderings, and physical parts through CNC machining and 3D printing.

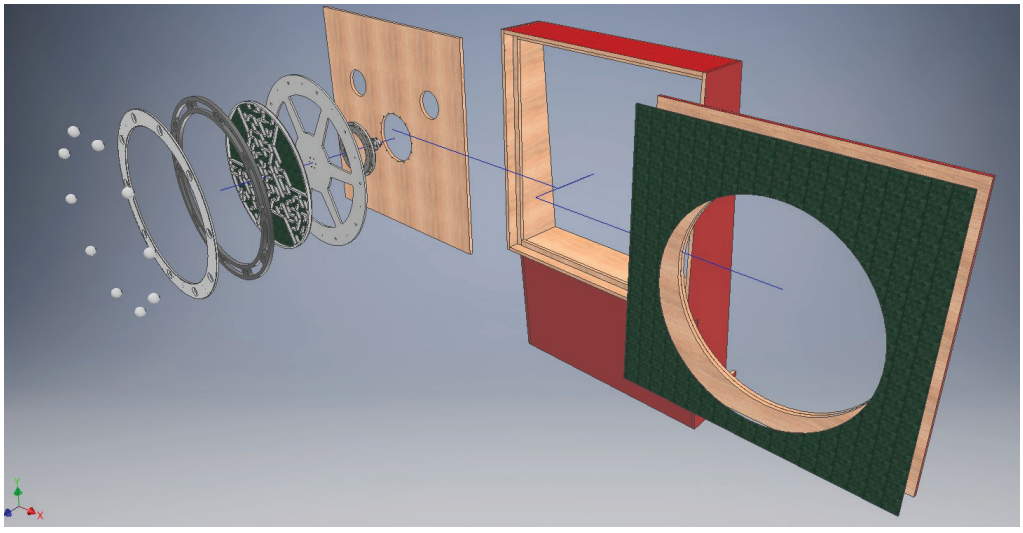
SIE'S PROTOTYPING PORTFOLIO

Panda Maze, Smithsonian's National Zoo, 2019

The Smithsonian's National Zoo asked SIE to build and test a prototype of an interactive maze for the Panda House. The goal of the interactive was to show visitors the rapidly growing challenges that pandas face every day when traveling through bamboo forests seeking food, shelter, and looking for a mate.



Concept sketch



3D computer model

The engineering prototype of the maze (left) next to the final version

SIE'S PROTOTYPING PORTFOLIO

Panda Maze, Smithsonian's National Zoo, 2019 *continued*

Smithsonian staff test the engineering prototype of the maze.

The final version of the maze at the Panda House

The exhibit opens to the public.

SIE'S PROTOTYPING PORTFOLIO

Trailblazing: Improving the Accessibility of Exhibit Graphics, National Postal Museum, 2019

SIE received a grant from the Smithsonian Accessibility Innovations Fund to develop strategies for improving access to exhibit graphics for visitors who are blind or have low vision. SIE built and tested two rounds of prototypes at the National Postal Museum for their exhibit, *Trailblazing: 100 Years of Our National Parks*.

Smithsonian accessibility user experts test the first iteration of the introductory rail.

Smithsonian accessibility user experts test the second iteration of the introductory rail.

Smithsonian accessibility user experts test the first iteration of the exhibit case rail.