CARDBOARD PROTOTYPING

Cardboard prototyping refers to prototyping 3D mock-ups of almost any physical object or environment out of cheap paper and cardboard.

Duration	Varies with the depth and complexity of the prototyping questions – from 1–2 hours to a few days
Physical requirements	A flexible space with good lighting (and enough room to build and also simulate interactions with the model), people, sheets of corrugated cardboard or foam board, X-ACTO knives, scissors, tape, hot glue guns, paper, sticky notes, overhead foil, foil markers, digital camera, cutting mats
Energy level	High
Researchers/Facilitators	1 or more
Participants	1 or more; 4–8 is a good group size
Research techniques	Use-it-yourself, participant observation, interviews
Expected output	Research data (specifically bugs, insights, and new ideas), raw video footage and photos, documentation of the tested variants

Cardboard prototyping is a common low-fidelity method to prototype and test physical objects and environments that are part of a service experience – for example, the interior of a shop environment, a ticket machine, furniture, devices and smaller props, and so on.[01] The prototypes are built quickly, using cheap paper and cardboard mostly. Other equally easy-to-use materials like foamcore, plasticine, or duct tape often complement the mix of materials.

Depending on the scope, the prototypes can be small-scale, actual size, or even bigger than life. To further explore and validate core functionality and the role of these objects in the context of the future service, cardboard prototyping is often used in conjunction with or as part of walkthrough approaches (e.g., desktop walkthrough or investigative rehearsal).

Prototypes made from cardboard are cheap and easy to make. Cardboard prototyping indeed has one of the lowest entry barriers of any of the prototyping methods. Almost everybody has done this before, either as a kid or as an

01 For example, see Hallgrimsson, B. (2012). *Prototyping And Modelmaking for Product Design*. Laurence King Publishing.

adult helping children. Just like paper prototypes, cardboard prototypes are clearly created to be thrown away. This makes it easier for those who created the prototype to let go and embrace necessary changes. Also, actual users taking part in the test tend to feel more comfortable about suggesting changes.

The most important part of cardboard prototyping is the process of prototyping itself. It helps to concretize the initial concept and explore its details, strengths, and weaknesses. A great way to start is to build many smaller scale versions before switching to full size, for the simple reason of speed.[02]

Scale models also set the stage for small-scale experience prototyping techniques like desktop walkthroughs, as you literally build the space and key artifacts to enrich the walkthrough experience.

Full-size models help to set the stage for immersive experiences like investigative rehearsal or process walkthroughs.[03] They encourage and enable a deeper exploration and iteration of the design. A great example for this comes from Chick-fil-A, which uses cardboard prototyping to test the set-up of a whole restaurant. New setups are built in foamcore (including walls, tables, coffee machines), then rehearsal techniques are used to test the flow and the experience with the design team, operators, and architects.

Cardboard prototyping follows similar steps to paper prototyping, replacing the paper prototypes of mostly 2D interfaces with more generalized 3D physical models (that in fact might contain paper prototypes within). Just like a paper prototype, a cardboard prototype is used by a test user to accomplish given tasks while an operator manipulates the different parts of the prototype to simulate the functionality of the object.

02 For example, early in the process, a six-hour prototyping session could push a team of 3–5 people to produce 20+ sketches and 3–5 desktop-sized cardboard prototypes before making a decision and building one full-sized one in the last two hours.

03 For an example where service designers set up a cardboard hospital, see Kronqvist, J., Erving, H., & Leinonen, T. (2013). "Cardboard Hospital: Prototyping Patient-Centric Environments and Services." In *Proceedings of the Nordes 2013 Conference* (pp. 293-302). A video is available at Cardboard hospital: https://vimeo.com/46812964.

Step-by-step guide
PREPARATION

1. **Choose a user:** Who should test this cardboard prototype? Choose a persona, a specific user type, or a key stakeholder.

2. **Review scope and clarify prototyping questions:** What do you want to learn? Do you want to test the whole or just a part of the object or environment? Which part (literally) are you most interested in? What are the tasks that you expect the user to do there? Think about the context: in which step of the customer journey does the object or environment play a role? Make a list of the tasks you want to test for later.

3. **Build the necessary parts:** Use simple materials to build the objects/environments or the parts thereof you have chosen to focus on. If the object is interactive, build everything you need to act out any activities.

4. **Assign roles and prepare:** Split your team to take on the roles of users, operators, and observers,

and ask them to prepare their parts. Apart from you as the facilitator, all roles can be played by one or more people. If you are not working with actual users, give the person or people who will act as the user(s) a few minutes to familiarize themselves with and empathize with the needs, motivations, and context of the chosen persona or user type. Allow for the operator to practice how to organize all the different parts to quickly be able to manipulate and simulate the object's or environment's interactions. Finally, ask the person who is going to act as a researcher to prepare the observation session.

Step-by-step guide

USE/RESEARCH

1 **Test the prototype:** Now conduct your test. Ask the user to perform a selected task. As the user starts to use the interface or carefully uses the object (i.e., handling it, pressing buttons, typing on keyboards, pulling handles, etc.), the operators react and simulate the reaction of the object or environment by manipulating, replacing, or adding parts. Iterate until the user has completed the task or failed.

2 **Keep a list of bugs, insights, and ideas, and review issues:** Make sure that during the whole test the observers record their observations, and create a list of the issues that you discover. After each testing session take a few moments to reflect on what worked, what didn't work, and what you would like to change or try next. Briefly discuss the issues you discovered and prioritize them.

3 **Revise your prototype (optional):** Are there any changes you can or should make right now? Remember that changes to cardboard prototypes can be made very easily and quickly. Do them now.

4 **Decide on the next task and iterate:** Check off the task that has just been simulated and quickly decide which you want to try next. Then go again.

5 **Document:** Document and finalize your work. Use photos or videos of your prototypes as well as key interactions to document the latest version from your prototyping session. Briefly reflect on your documentation and identify critical issues as well as problem or opportunity areas that need to be addressed in the next steps in the design process.

6 **Present (optional):** Use a storytelling approach to present your last iteration and key learnings to other stakeholders and gather feedback. It is often useful to also capture the presentation and the final feedback rounds on video and add them to your documentation.

Method notes

→ **Speak out loud:** Encourage users to think out loud while they go through the given tasks.

→ **Silent operators:** The operators are usually silent. Ask them to refrain from explaining how the prototype

should work. The rule of thumb is: if the device or computer would not say/print/bleep it, the operators should not either.[01]

→ **How to build:** Start by building the basic forms (e.g., the body of a vending machine or the body of a convertible). Then add some of the moving parts. Moving parts can either be roughly built or simply be added or replaced during the simulation to cater for a certain functionality (e.g., the robot arm of the vending machine or the convertible top for the car). Finally, add paper prototypes of software/interface elements (e.g., displays, keyboards, control lamps).

→ **Use what you have:** Cardboard prototyping can get you carried away. People start prototyping everything just because it is fun. However, if you have a tablet lying around, avoid creating a cardboard tablet. Use what you have. ◄

01 Of course, you can always temporarily lift that rule to have the operators help the user. You can consciously decide to enable a team discussion if this becomes necessary during the process – for example, over a roadblock that cannot be solved right away.

A Early cardboard prototypes are cheap and easy to make. This has one of the lowest entry barriers of all the prototyping methods.

B The prototypes can be small-scale, actual size, or even bigger than life, depending on their scope.

C Contextual full-scale cardboard prototyping for a citizen-centric council office.[01]

D Conceptualizing three material delivery units and building 1:5 scale models.

01 Photo: We Question Our Project.