Prototyping

A. What is Prototyping?

Prototyping is the process of transferring ideas and experiments from your head to the physical world. A prototype can be a wall of post-it notes, a role-playing exercise, a space, an object, an interface, or even a storyboard. The resolution of your prototype should be proportional to your project's progress. Keeping your prototypes rough and brief during early explorations lets you learn quickly and study a variety of options. Prototypes are most successful when they can be experienced and interacted with by people, i.e. - the design team, the user, and others. What you learn from those interactions can help you develop greater empathy and develop effective solutions.

B. Why do we need to use Prototyping?

Constructing a prototype is one of the steps that come before releasing the final product. Prototyping a product has several advantages, such as -

o Prototyping allows for the application of an idea by understanding which aspects of it are hard or impossible to implement. Making a prototype helps reveal previously unknown technical and financial constraints.
o Prototypes help to test the usability of a site by looking into the overall navigation. It helps understand the accessibility of the site and check on the placement of visual accents. The data obtained from the prototype allows designers to make quick changes to the idea.
o Prototypes help in presenting ideas and concepts to users in a more concrete way, through the collection of opinions, recommendations, and testimonials.
o Prototypes help in the reduction of risks, as it directly affects the most crucial components of a project, i.e. the resource, time, and budget. It helps in figuring out hidden shortcomings and functional gaps.
o Opinions from potential users help to improve on the existing idea till the conception of the ideal product. Creating several prototypes before the launch of a large-scale product helps save extra costs of reprogramming the production line.
o Prototypes work in simulating the final product, by attracting potential users into investing in it. It helps in testing the correctness of a design and identifying design errors before it reaches the final stage.
o Exposure to prototypes aids in the unification of all the ideas and allows stakeholders to see the product from a new perspective. It enables them to see it materialize and provide focused feedback on the desired details.

C. Types of Prototyping:

Prototyping methods are generally divided into two separate categories: low- and high-fidelity prototyping.

i.   Low-Fidelity Prototyping

Low-fidelity prototyping involves the use of basic models or examples of the product being tested. For example, the model might be incomplete and utilise just a few of the features that will be available in the final design, or it might be constructed using materials not intended for the finished article, such as wood, paper, or metal for a plastic product. Low-fidelity prototypes can either be models that are cheaply and easily made, or simply recounts or visualizations of them.

a.   Examples of low-fidelity prototypes:

- Storyboarding.
- Sketching (although Bill Buxton, a pioneer of human-computer interaction, argues sketching is not an example of prototyping).
- Card sorting.
- 'Wizard of Oz'.

b.   Pros of Low-Fidelity Prototyping

- Quick and inexpensive.
- Possible to make instant changes and test new iterations.
- Disposable/throw-away.
- Enables the designer to gain an overall view of the product using minimal time and effort, as opposed to focusing on the finer details over the course of slow, incremental changes.
- Available to all; regardless of ability and experience, we are able to produce rudimentary versions of products in order to test users or canvas the opinions of stakeholders.
- Encourages and fosters design thinking.

c.   Cons of Low-Fidelity Prototyping

- An inherent lack of realism. Due to the basic and sometimes sketchy nature of low-fi prototypes, the applicability of results generated by tests involving simple early versions of a product may lack validity.
- Depending on your product, the production of low-fi prototypes may not be appropriate for your intended users. For instance, if you are developing a product bound by a number of contextual constraints and/or dispositional constraints (i.e. physical characteristics of your user base, such as

users with disabilities) then basic versions that do not reflect the nature, appearance or feel of the finished product may be of scant use; revealing very little of the eventual user experience.

- Such prototypes often remove control from the user, as they generally have to interact in basic ways or simply inform an evaluator, demonstrate or write a blow-by-blow account of how they would use the finished product.

ii.   High-Fidelity Prototyping

High-fidelity prototypes are prototypes that look and operate closer to the finished product. For example, a 3D plastic model with movable parts (allowing users to manipulate and interact with a device in the same manner as the final design) is high-fi in comparison to, say, a wooden block. Likewise, an early version of a software system developed using a design program such as Sketch or Adobe Illustrator is high-fi in comparison to a paper prototype.

a.   Pros of High-Fidelity Prototyping

- Engaging: the stakeholders can instantly see their vision realized and will be able to judge how well it meets their expectations, wants and needs.
- User testing involving high-fi prototypes will allow the evaluators to gather information with a high level of validity and applicability. The closer the prototype is to the finished product, the more confidence the design team will have in how people will respond to, interact with and perceive the design.

b.   Cons of High-Fidelity Prototyping

- They generally take much longer to produce than low-fi prototypes.
- When testing prototypes, test users are more inclined to focus and comment on superficial characteristics, as opposed to the content.
- After devoting hours and hours of time producing an accurate model of how a product will appear and behave, designers are often loathed to make changes.
- Software prototypes may give test users a false impression of how good the finished article may be.
- Making changes to prototypes can take a long time, thus delaying the entire project in the process. However, low-fi prototypes can usually be changed within hours, if not minutes, for example when sketching or paper prototyping methods are utilised.
  Due to the pros and cons of low-fi and high-fi prototyping, it should be no surprise that low-fi prototyping is the usual option during the early stages of a Design Thinking project, while high-fi prototyping is used during the later stages, when the test questions are more refined.

D. Guidelines for Prototyping:

It is important to remember that prototypes are supposed to be quick and easy tests of design solutions. Here are a few guidelines that will help you in the Prototyping stage:

- **Just start building**

  Design Thinking has a bias towards action: that means if you have any uncertainties about what you are trying to achieve, your best bet is to just make something. Creating a prototype will help you to think about your idea in a concrete manner, and potentially allow you to gain insights into ways you can improve your idea.

- **Don't spend too much time**

  Prototyping is all about speed; the longer you spend building your prototype, the more emotionally attached you can get with your idea, thus hampering your ability to objectively judge its merits.

- **Remember what you're testing for**

  All prototypes should have a central testing issue. Do not lose sight of that issue, but at the same time, do not get so bound to it so as to lose sight of other lessons you could learn from.

- **Build with the user in mind**

  Test the prototype against your expected user behaviours and user needs. Then, learn from the gaps in expectations and realities, and improve your ideas.

E. Eight common ways to prototype:

a. Sketches and Diagrams

Any sketch, even the absolute messiest can create a wonderful low-fidelity prototype.

Sketching diagrams, mind-maps or the structure of your ideas can really help others to get a well-rounded idea of what you aim to achieve. With sketching you can draw out the various touch points that affect a user's journey and you can also detail what processes happen when different touch points are pressed.

Anyone can sketch out an idea and it's a great way to run through the initial stages. As these prototypes are disposable you can really narrow down so much without expending too much energy or time.

b. Paper Interfaces:

Paper interfaces are made using multiple sheets of paper and sketching movable elements and interactive features on different sheets to create a more in depth look.

Digital products like mobile apps, websites and screen based products often require a quantity of prototypes in the run up to the final design. Paper interfaces are handy in the beginning as they are incredibly malleable. With paper interfaces you can replace different sheets of paper, sketch over previous ideas or cut out elements and move them around the prototype.

c. Storyboards:

Everyone loves a story and storyboarding is a great way of guiding people through a user experience journey. Storyboarding is a technique derived from the film industry and allows you a quick and cheap way of walking stakeholders and users through a product.

While it's great to be able to understand a user journey - storyboarding isn't great for fine tuning the details of products as they tend to be broader in nature and focus less on the smaller details.

d. Lego prototypes:

Now we know what you're thinking - and yep, it's great news, Lego is for adults too! Using lego can be incredibly helpful in creating a prototype. It's versatile and able to spark imagination. It's easy, cheap and can be put together and taken apart in no time at all.

You can use Lego to simulate a users journey all the way through to creating rough prototypes of products.

e. Role-Playing:

Role-playing is considered experiential prototyping, meaning that it allows your design team to explore the system you are targeting physically. Role-playing by re-enacting scenes and situations you are attempting to improve can help the team to get a better understanding of what is working and what isn't. Role-playing also works wonders for reflecting on the product as you can remember experiences more vividly when you physically experience them.

Role-playing can take many forms but the best is when you simulate the physical environment of the user. You can use props, use audio simulations such as music and use objects around your workplace to bring more realism into the scene.

f. Physical Models:

These are considered high-fidelity prototypes. Physical models can be made out of a wide range of materials, such as paper, cardboard, clay or foam and can be a range of sizes.

The purpose of the physical model is to go a step further than a sketch and bring the two-dimensional into the three-dimensional. This brings all the detail forward and brings a sense of realness. This allows for much stronger user testing as it can spark discussion about the form factor of the solution.

g. Wizard of Oz Prototypes:

Wizard of Oz prototypes are illusory based prototypes. What this means is that the functions are faked in order to save time and expenses but to give the same effect of a finished product.

For example, if testing software with users, the designer would hit computer driven responses when the tester hit certain touch points. Here the designer is mimicking what the final product would do but is actually controlling it as it hasn't yet been finalised.

It's important to note that during this prototyping method the designer is with ethical boundaries - there is no "tricking" for immoral gain.

h. User-Driven Prototypes:

Now this one is a world apart from the others mentioned. Instead of building a prototype to test on users - designers will ask users to create something within set constraints.

During this process designers can see what their users prioritise and how their minds work, which gives them lots of insight into the assumptions the designers' themselves could've made. Designers can use user-driven prototypes to gain empathy with users or to fine-tune certain details of the product once they have an idea in place.

F. How do Feedbacks from Prototypes benefit the Design Thinking Process?

After the crafting of an experimental model of the proposed design, designers try to understand its usability through user feedback. This feedback helps to further develop the design and make it more user-focused. Through prototyping, you can achieve the following benefits -

o Provides a foundation from which ideations towards improvement can be drawn.
o Quick implementation of changes to avoid commitment towards a single ideal version.
o Feedback from users on prototypes helps design teams understand where changes are needed.
o Helps improve time-to-market by reducing the number of errors to fix prior to the release of the product.
o Getting an insight into the most minute requirements of the user thus helps to understand the problem and accessibility issues better.

G. What does Prototyping help us achieve?

Prototyping has traditionally been thought of as a technique to test functionality. However, it is used for a variety of reasons, including the following (non-exclusive) categories:

- o Gain empathy - Even in the pre-solution phase of your project, prototyping can help you develop a better knowledge of the design space and your user.
- o Explore - Construct in order to think and create a variety of solution-centric possibilities.
- o User testing and refinement - Create prototypes (and the context) to test and refine solutions with users.
- o Inspire others (coworkers, clients, consumers, and investors) by demonstrating your vision.

Prototyping helps us to learn and solve conflicts through the elimination of ambiguity and miscommunication. It assists in Ideation and enables the testing of a number of ideas without the investment of excess money, time and effort. Prototyping helps to identify a variable to investigate and break down a complex problem into smaller, testable portions.

Prototypes take us a step closer to the final product

Prototypes help to build a design from conception. A design that users and stakeholders are able to use and understand. It helps with finding a solution to a design problem that may not have been considered before. A design with a prototype helps the designer figure out usability challenges and fix them with ease. By understanding the audience and their goals, designers are able to narrow down on the details that might require a re-working before it moves onto the testing stage, thus helping to save money, time, and effort.

Once prototyping a design is done, designers look to test the completed product. It is the final stage of the 5-stage model of Design Thinking. Results that are achieved during the testing stage help designers understand how users might react to the solution provided. Even though it is the final stage, alterations, and changes to the product can still be made to ensure usability.

In Conclusion

More often than not, you tend to make decisions based on assumptions and biases. As a result, despite putting a lot of effort into brainstorming and formulation, it fails to connect with users. Prototyping prevents this from happening. Prototyping allows you to test your assumptions by knowing the consumer and improving on current ideas when used regularly. It enables you to take a more human-centered approach to problem-solving and to work toward bringing your ideas to life.