Mastering UX Design with Effective Prototyping

Turn your ideas into reality with UX prototyping

Apurvo Ghosh

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Dedicated to

*My parents **Amode** & **Ebha***
*My beloved wife **Durba***
&
*My daughter **Aditri***

About the Author

Apurvo Ghosh has more than 16 years of experience in the IT industry. He works in an Indian IT service-based biggie as a Senior UX Architect. He is part of a multidisciplinary team where he delivers compelling UX designs and services that support business objectives and enhance the way people live, work, and communicate. He takes a keen interest in helping the team to cope with UX design technology transitions and adds value across teams. He creates solutions that address new challenges in UX design and the visualization of complex data. He defines Roadmaps, Strategies, Drive Innovation & Foster culture of design across the organization's external and internal clients. He manages interdisciplinary teams to ship top-notch design solutions. He has a knack for writing and has authored whitepapers as well as written quite a handful of articles in the leading UX websites. He is Masters in Computer Applications (MCA) and is a **Certified Usability Analyst (CUA)** from HFI.

About the Reviewer

Vishnu V S is a seasoned UI UX designer with 6 years of hands-on experience in the field. Currently, he holds the position of Sr. UI UX consultant at Tata AIA, showcasing his expertise and proficiency in the domain. Throughout his career, Vishnu has had the privilege of collaborating with prestigious organizations such as Accubits Technologies and KRDC Private Limited.

Since 2019, Figma has been his go-to design tool. This powerful platform has enabled him to bring his innovative ideas to life and create user-centric experiences that leave a lasting impact. His passion for his work is evident in every project he undertakes, as he constantly strives to push the boundaries of digital product design and make a positive difference in the industry. His dedication to creating meaningful and intuitive interfaces has earned him a reputation as a highly skilled and respected professional in the design community.

Acknowledgement

I want to express my deepest gratitude to my family and friends for their unwavering support and encouragement throughout this book's writing, especially by my parents and wife.

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Preface

Prototyping is a discipline that is widely used for testing, designing, and refining user interfaces. Apart from IT, prototyping is used in a lot of industries, such as manufacturing, medical, aerospace, defence, etc. But, in this book we would be focusing on the usage of prototyping in IT sector.

"Prototyping is practice for people who design and make things. It's not simply another tool for your design toolkit — it's a design philosophy."

Prototyping is an extensive method used for communicating the functionality of your product or service, validating the functionality and seeking feedback from your stakeholders, clients, and other members in the team.

–Todd Zaki Warfel

Welcome to the first edition of "**Mastering UX Design with Effective Prototyping"** where you will get a comprehensive introduction to a very popular and multidisciplinary field and art of prototyping. This book is aimed primarily at undergraduate, masters, and doctoral students from a range of backgrounds studying introductory classes in human–computer interaction, interaction design, web design, software engineering, digital media, information systems, and information studies. Apart from students, this book can also be used by people coming from diverse backgrounds like, UI/UX Designers, UX Architects, Information Architects, User Researchers, Business Analysts, Product Managers, Project Managers, etc.

While reading the book, you can gain insights into the capabilities and preferences of individuals, the range of available technologies, and acquire knowledge on how to transform an idea into a prototype. This book aims at imparting practical techniques to facilitate prototype development while exploring popular prototyping tools. In the end, these resources lead to significant time, cost, and effort reductions.

This book consists of **12 chapters**, exploring various prototype methods and approaches aimed at helping you generate rapid and marketable ideas for presentation to your clients and stakeholders. You would also learn how to create a prototype for your digital product, which you are building from scratch or if there is feature enhancement(s) in your product. The crux of this book is that it has been written after doing a lot of research and the theory is backed up with quite a handful of tutorials and examples, which will help you to get started as and when needed. You would gain valuable insights into prototyping best practices and learn what pitfalls to avoid during the prototyping process.

Happy reading! It is time to delve into the guts of Prototyping. So, let us get the ball rolling.

Chapter 1: Fundamentals of Prototyping - helps the readers get comfortable with the basic concepts related to the topic of prototyping. We will discuss why prototyping is a useful tool in the design process. Also, the readers will be able to look back at history as to where did Prototypes originate from. Readers will also get a deep understanding on the need for prototyping and its pros and cons. You will get an overt glimpse of the various prototyping tools prevalent in the market. In the later part of the book, I will cherry-pick few of my favorite prototyping tools and discuss each of them in detail. You will also get detailed insights as to who would be benefitted from the creation of prototypes and why. You would get to know the benefits and the drawbacks Prototypes. This chapter further helps understands how prototypes help us in arriving at better estimates. And finally, we will wrap up the chapter by giving an overview of design thinking and the role of prototyping in it.

Chapter 2: Process of Prototyping – aids the readers to learn about the process of Build, Learn, and Measure. We will go through the process of prototyping. The readers would also get a deep understanding on the Prototyping Culture prevalent in the industry. We will learn about how to create a prototype from concept. We will learn about the various prototyping models and prototyping approaches. We will get to know when can Prototyping be used in order to get maximum benefits out of it. We will also explore the key considerations for prototyping, which can be referred to as a prototyping checklist. Lastly, we will also get acquainted with the Rapid Prototyping method.

Chapter 3: Types and Fidelities of Prototypes – helps the readers learn about the types and fidelities of prototypes. We will explore the differences between static and dynamic prototypes and get to know the differences between Sketch, Mockup, Wireframe and Prototype. Lastly, we will learn the usage of prototypes in different industries and how prototyping helps us in better estimation and budget planning.

Chapter 4: Effective Requirement Gathering Techniques – we will learn how to efficiently elicit business requirements. Fulfilling user requirements is equally vital for the success of a prototype, product, or organization, as catering to business requirements. In this chapter, we will discuss some approaches for understanding business strategy as well as the best practices used for gathering requirements.

Chapter 5: Prototyping Your Software Products – allows readers to learn about prototyping products. Product design has a huge impact on our day-to-day lives, directly or indirectly. The internet and the open-source community have modernized the IT industry, and the software products have made our lives easier. By prototyping your software product, you will learn how to improve your idea while working for a startup, a renowned company, or as an entrepreneur.

Chapter 6: Exploring Prototyping Tools - Enhancing Design Efficiency and Effectiveness – allows readers to choose their prototyping tool. Prototypes give you a chance to play with your ideas and turn them into something tangible, which can be tested and iterated. As designers are accountable to design User Interface as per the requirements, not all understand what the clients' and end-users' expectations really are. Subsequently, as designers, you would need to join a series of meetings, revert a plethora of emails, etc. to reach the final design, which is an uphill task. All these problems can be swept away by using the right prototyping tool, as explained in this chapter.

Chapter 7: Paper Prototyping – throws light on the underlying concepts of paper prototyping. UX designers have been using paper prototyping since four decades to brainstorm ideas, get feedback on them, and iterate to refine the design. In contrast to earlier methods of digital prototyping, creating paper prototypes is faster, uncomplicated, requires no technical skills, is easy to iterate, and does not accentuate on pixel perfect designs. Additionally, participants feel at ease critiquing sketches rather than high fidelity designs. With various prototyping tools getting launched in the market every year, do you think creating a paper prototype is beneficial or not worth a dime? You will get an answer to this question after reading this chapter.

Chapter 8: Picking the Right Prototyping Tool – allows readers to get acquainted with the factors kept in mind before finalizing the right prototyping tool for your prototyping needs. Since many prototyping tools are launched in the market every year, you should always stay abreast with the latest tools. You can test them post-launch to ensure that using any of them might improve your prototype's workflow, which consequently helps you to accomplish better results. Given the continuous influx of prototyping tools into the market each year, the question of which tool to select for your prototyping requirements becomes a significant dilemma.

Chapter 9: Prototyping Using XD – allows readers to learn about XD, which is one of the most comprehensive and reliable UX design tools used to build a variety of prototypes. It is free to install on Mac and Windows machines. One of the most striking features of XD is that it is part of a popular Adobe package, which comes with your CC subscription and seamlessly integrates with other well-known applications in the design segment, such as Photoshop and Illustrator. In this chapter, you would learn how to build a prototype using XD, features and plugins of XD.

Chapter 10: Prototyping Using Figma – allows readers to get familiar with Figma. It is a comprehensive and reliable UX design tool for building various prototypes. It is free to install on Mac and Windows, and is excellent for team collaboration. In this chapter, we will learn about Figma's interface and how to build a prototype using it. We will learn about the pros and cons of Figma and get acquainted with Figma's advanced features and plugins.

Chapter 11: Testing Your Prototype – This chapter accentuates the significance of Prototype Testing. While attempting to create a product that aligns with the needs of your target user groups, failure at any stage can lead to disappointment. This is where prototyping comes in as your savior. Before a product gets officially released, the stakeholders ensure that the key focus areas, such as usability, accessibility, visual design, and user engagement is of the highest quality. Testing prototypes is a repetitive process wherein usability practitioners try to find flaws in the product with respect to validation from real users via surveys, comments, etc. It is the single most effective way of finding out how a product will compete in the market and whether it will be able to cater to the end-user requirements or not. In this chapter, we will learn about the best practices of how to conduct clickable prototype testing and the key points to keep in mind while testing the prototype.

Chapter 12: Avoiding Common Prototyping Mistakes – discusses the common prototype mistakes and how we can avoid it. In addition, you will understand how we should always stick to designing and then prototyping in order to avoid mistakes. Overengineering is the most repeated mistake people make when creating prototypes. Designers tend to spend a lot of time and resources constructing and improving their first prototypes, whether it is a SAAS product, a piece of software, or a physical object, while understanding that these prototypes are designed to be less than ideal. As a result, prototypes were created in a longer duration as expected, costing tens of thousands of dollars in development expenditures. Project teams frequently run out of resources or inspiration before launching their first prototype's iteration.

It is a natural instinct to avoid getting into a predicament by presenting someone an unfinished or half-baked product. Many people also want to test as many elements as possible in order to provide users with a complete experience.

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Fundamentals of Prototyping

Introduction

It is recommended for all the readers to read the preface and the table of contents. They have a lot of information about what you can expect from this book. So, if you have not read it, go through it line by line.

In this chapter, we are going to start out the exciting journey of learning the fundamentals of prototyping, which will help you build a strong base and consequently, help you better understand the subsequent chapters of the book. We will flip through the history pages to see when prototyping came into the reckoning. We will also explore the finer details as to why prototyping is important and the usage of prototyping in different industries. We will get to learn about the popular prototyping tools that are prevalent in the market. We will also learn how prototyping aids better estimation and budget planning. And lastly, we will briefly discuss design thinking and the role of prototyping in it. So, just fasten your seat belts and let us dive into prototyping.

Structure

We will learn the following topics in this chapter:

- Overview of prototyping
- History of prototyping

- Provotype vs prototype
- Need for prototyping
- Usage of prototyping in different industries
- Popular prototyping tools
- Benefits of prototyping
- Drawbacks of prototyping
- Usage of prototypes: Diverse IT roles
- Use of prototypes to arrive at better estimates
- Design thinking – The prototype stage

Objectives

The objective of this chapter is to make you comfortable with the basic concepts related to prototyping. We will discuss why prototyping is a useful tool in the design process. Also, you will be able to look back at history as to where prototypes originated from, and you will develop in-depth understanding of the need for prototyping and its pros and cons. The readers will also get an overt glimpse of the various prototyping tools prevalent in the market. In the later part of the book, I picked few of my favorite prototyping tools and will discuss each of them in detail. You will also get detailed insights into who would be benefitted from the creation of prototypes and why. You will get to know the benefits and the drawbacks of prototypes, along with learning how prototypes help us arrive at better estimates. And finally, we will wrap up the chapter by giving an overview of design thinking and the role of prototyping in it.

Overview of prototyping

About 3 to 4 years ago, one of my friends was working for an e-commerce start-up. The product manager of the company created a detailed roadmap of the application, which was supposed to be used by thousands of people and took up at least a year to develop. This means a lot of time and money was invested in maintaining the product team comprising of product managers, business analysts, developers, designers, and UX experts.

The app finally reached the UAT phase after 11 months of perseverance, hard work, and dedication. Although there were a few flaws in the application, the stakeholders were satisfied with it. Without doing the beta tests on a selected group of users, the company decided to launch its application in the market to make in-roads into the competitive ecommerce space. The stakeholders thought launching the product right away was better than waiting to perfect it before the launch. But, as per you, what would have happened?

Yes, you guessed it right! The application received a lukewarm response in the market. What could have been the reasons for this?

- Probably, the product manager forgot to include a feature in the roadmap for this release that might have been essential to the users, but adding it in the eleventh hour is not what the doctor had ordered.
- Alternatively, maybe the user journey would have been confusing, making the application unusable. Whatever it is, the team had wasted many hours (and a lot of money) because of something that nobody thought of in the initial phase. And most importantly, you need to get back to work on it, which is the worst feeling.

Now, what should have been done to avert this catastrophe? Yes, you guessed it right. You should have built a prototype first.

What is a prototype? Whatever that can be improved upon is known as a prototype. A prototype is the first or original example of something that has been or will be copied or developed; it is a model or a preliminary version; for example, a 3D miniature model of a house.

I love taking an idea... to a prototype and then to a product that millions of people use.

- Susan Wojcicki

As you make a prototype, assume you are right and everyone else is wrong. When you share your prototype, assume you are wrong and everyone else is right.

- Diego Rodriguez Telechea

Figure 1.1 shows the various UX Terminologies, which are associated with prototyping:

***Figure 1.1**: Prototyping*

The terminologies mentioned in *Figure 1.1* will be explained in detail as we take a deep dive into the prototyping process. Have you ever thought of a world where you do not have a place to live, work, play, learn, worship, meet, and so on. Every year, millions of such places

are created; who is responsible for designing them? It is the architects who are responsible for designing these places. Their role is quite instrumental in every stage, from laying down the initial concept to the completion stage of the building. Even after completion of a project, the architect often remains immersed in ensuring that the other aspects of the building are also up to the mark, like cross-ventilation, energy efficiency, and so on.

So, is appearance the only aspect that architects pay attention to? The answer to this question is 'No'. Along with appearance, there are many attributes to take care of if a delightful customer experience needs to be created. So, how is the foundation of a building laid down? Initially, the architects gather the requirements after having a discussion with the clients and other stakeholders. During the documentation phase, the responsibilities are to capture the design on paper, produce detailed drawings, create prototypes, and use technology like CAD to test the feasibility of the design. During the paper prototype stage, several revisions and updates are done to incorporate changes based on the client's requirements, budget, and stipulated timeframe. Once the design documents and prototypes are approved, the actual design of the building commences. *Figure 1.2* shows an architectural prototype:

***Figure 1.2**: Prototype*

Similarly, while cooking a dish, you can write down a recipe to test, and update the ingredients depending on how the results tasted. Similarly, this book is also a prototype. The technologies and the tools explained in this book will continue to evolve, and I would keep writing the updated versions.

Prototyping is the process of creating a design idea only for testing and assessment purposes. As per the Collins dictionary, the definition for prototype is, "*A prototype is a new type of machine or device which is not yet ready to be made in large numbers and sold*."

Prototype is a design model that helps teams apply ideas and test them on users, which would tell them how the final product works. Accordingly, they can improve and corroborate the designs, which would help the organization release the right products. They let you experience how the product would work, how the screen transitions would work, and consequently, allow you to test the usability and completeness of the design. But many people from the non-

IT and IT fraternity think that prototypes are finished products, which is absolutely ludicrous. Designers tend to create prototypes that have a certain degree of fidelity associated with them. In reality, prototypes can have any type of fidelity you need – from paper sketches to fully realized designs. Depending on what your clients' requirement is, they can simulate a small or entire part of the interaction of how the application is supposed to work.

In other words, prototyping a product is important because it has the following characteristics:

- It provides an accurate test of the design and its intended function.
- It allows the prototype design to be tested in its environment. The possible design issues, which came up during the testing process, can be highlighted and updated ahead of the creation of the final product.
- It provides an opportunity for the product team to have a look at the prototype to get familiar with the design before the final development of the product commences.
- It allows the stakeholders and clients to review the prototyped design and add value to the final product.

We all had great thoughts that sound quite promising and look awesome on paper. It is only when we try to implement those ideas that we come across the limitations that can prove detrimental for our product. *Figure 1.3* shows a mobile prototype illustration:

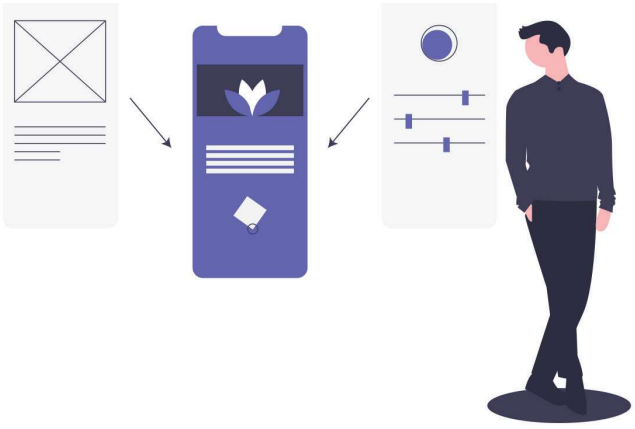

***Figure 1.3**: Mobile prototype*

When a team is working on a new product, the design team puts in a lot of effort to generate ideas. Now, some of the ideas that the team generates can be good, but others can be mediocre. Not only have the stakeholders invested a lot of money but the reputation of your company is also at stake. So, the onus is on the team to create a wonderful product that delivers a delightful user and customer experience. You cannot afford to be complacent and should do your homework before the product is launched in the market. Now, the most important part is that before releasing the product to the market, it should meet the end users' needs. And what is the most appropriate way to ensure that your product meets all the expectations? Yes, you guessed it right - prototyping.

Also, note that prototypes are ideas that are tested, tried, explored, or used to convey design concepts. They can be a low-fidelity representation of your product, which can be in the form of any of the following:

- a simple sketch or series of sketches
- a basic wireframe or wireframes
- an interactive prototype, which can have events like, **onclick**, **onmousehover**, **ontap**, **delay**, and so on; this helps users look at the screen transitions
- a fully interactive implementation, having different fidelities, such as low, medium, and high

You will find several techniques in this book that are being used to prototype native web, desktop, Android, and iOS apps.

In this book, we will be concentrating on creating prototypes for software products, however, following are a few prototype examples that are beyond the scope of this book:

- **Accurate Test of the Design:** It provides an accurate test of the design and its intended function.
- **Physical products**: It is important to prototype these products and understand how to use them. However, while designing physical objects, the focus is on topics like 3D design, manufacturing, communication, and 3D printing, which are beyond the scope of this book.
- **Processes, systems, or models**: These can be prototyped as well and require multiple iterations of prototyping, which provides a graphical framework for complex strategies. But it is beyond the scope of this book, so we are not getting into the details.

The term prototype has different meanings, depending upon the business or market you are designing for. Prototypes are kind of representation of a design idea, regardless of the medium it was developed for. Software design prototypes can be quite different from automotive industry prototypes. The one thing that prototypes across industries have in common is where and how they are introduced into the design and development process. Prototypes are typically used to convey and test ideas in the concept development phase.

The intent of prototyping is to create and test the features that help in meeting end users' expectations. And after the prototypes have been approved by the stakeholders, our vision comes to life. Prototypes are not merely beta tests, but they are your product's version that can be used for testing. It really does not matter whether a prototype is in the form of a paper, low fidelity, high fidelity or HTML, it should provide you miniscule details as to how user would be using your product. As a matter of fact, this chapter explains the prototyping concepts and sets the foundation for what you will be exploring when each and every concept of prototypes is explained in this book.

History of prototyping

The history of prototyping takes us back to the late 1960s, when an engineering professor, Herbert Voelcker, did certain fascinating things with PC-controlled and programmed machine devices. Voelcker was attempting to discover a way to customize the machine tools using a design program's output of a PC. The first major work in prototypes was done back in the late 1980s when the first prototyping technique came into existence, which was used for the creation of model parts. *Figure 1.4* illustrates the history of prototyping:

***Figure 1.4**: History of prototyping*

- **In 1970s:** Voelcker invented a mathematical tool that proposed a 3D concept, which resulted in coming up with an initial set of theories that helped in developing the first algorithmic and mathematical theories. These theories were used in the design of almost everything, ranging from the smallest toy cars to the tallest high-rise building. Vollecker's principle had changed the designing strategies in the last 70 years, but the earlier methods are still used and prevalent. Older methods used machines or machine tools that cut pieces of metal and left the necessary parts as needed.
- **In 1980s:** In 1987, Carl R. Deckard, a researcher at the University of Texas, came up with an innovative idea. He pioneered the field of layer-based manufacturing and came up with the idea of creating a model layer by layer. He used laser light to combine 3D models to combine layers of metal powder into a solid sample. Deckard developed this idea in a way called 'Selective Laser Sintering'. The results of this method are encouraging. The history of prototyping is completely new and modern. However, the prototyping technique has been a revelation of late and has grown rapidly to deliver amazing results.

The innovation, findings, and research of Voelcker and Deckerd have given a lot of momentum to the new rapid prototyping industry known for its fast-paced design or product design. It has bought about a radical change in the design and manufacturing process. Although there are many references to those who pioneered rapid prototyping, the industry gives credit to Charles Hull for the manufacturing of Apparatus for Production of 3D Objects by Stereolithography.