Chapter 1
Getting started with design

Great design rarely happens because of a stroke of genius. It is a creative process that iteratively develops, tests, and refines ideas on how to solve a problem. The process starts with identifying the problem and ends after shipping the app. It roughly consists of two steps (figure 1.1). The first step, finding the right problem to solve, is to explore the problem space. The second step, finding out how to solve the problem right, is to explore the solution space. The reason why both steps are represented by diamonds is that they require divergent thinking to discover possible ideas and convergent thinking to narrow those ideas down to the best idea. The point in between the two diamonds is the definition that frames the design challenge based on a thorough analysis of the problem. One of the greatest mistakes is to omit the left diamond, the problem space, and end up solving the wrong problem.
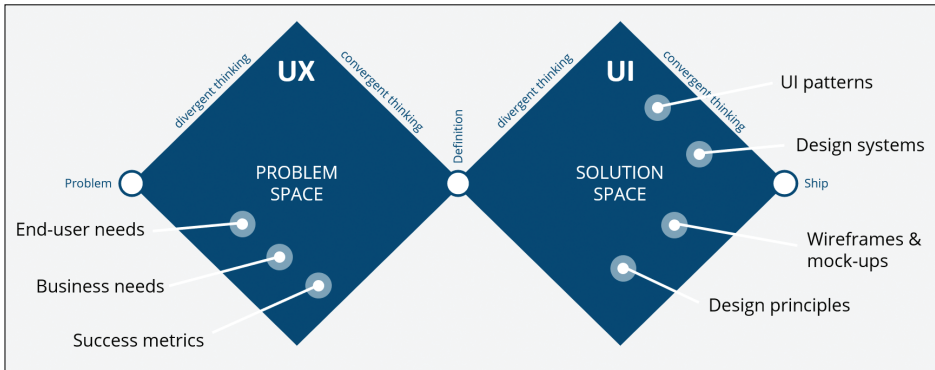

Figure 1.1. Double-diamond design methodology.

This chapter introduces important user interface (UI) design concepts that will help you create more attractive apps. It also shows how thinking through the user experience (UX) will lead to increased usability and ultimately a successful app.

Defining the problem

We often judge apps by the way their UIs look. But that's only half the truth because UIs look good only when they feel good, and they feel good when they are useful. In other words, ugly but useful trumps pretty but pointless. To create something useful, you will first need to explore the problem space (first diamond in figure 1.1), which includes a cumulative understanding of the following:

- **End-user needs:** Who are the users? What are they trying to accomplish? Which problems are they trying to solve? How successful are they in doing that?

- **Business needs:** What are the business's needs? Why are we expending time and money in doing this? What is the purpose of the app?

- **Success metrics:** What does success mean in this instance? How do we define success?

UX means to understand the users and their behaviors, attitudes, emotions, and motivations to use your app. To gain this understanding requires UX research, such as conducting interviews or facilitating workshops. Keep in mind that what the users need and what the business requires can often be diametrically opposed. What users want may not be good for the business, and what the business asks for may be disliked by users. Balancing the two is an aesthetic but important task. Designing a great UI manages to marry both needs into a cohesive whole.

The goal within the first diamond, therefore, is to define the area to focus on and the right problem to solve. This definition is sometimes referred to as UX strategy and serves as the vision for exploring the solution space.

Wireframes and mock-ups

Exploring the solution space (second diamond in figure 1.1) typically involves designing potential UI solutions through wireframes and mock-ups in an iterative manner. It starts with conceptual design, then gradually increases visual fidelity to colors, typography, and dimensions so that the design moves from sketch to photo-realistic and cumulates in ongoing support of and collaboration with front-end development efforts.

Wireframes are sketchlike illustrations of the UI, similar to the images used to introduce the patterns in this book. Their purpose is to communicate ideas and workflows, validate design assumptions, and identify gaps and holes in the requirements. It's faster and more cost effective to make changes to the wireframes than to spend time later to reconfigure the app or even rewrite code. Wireframes are the most important UI design artifacts and serve as the contract between the client and the developer for what needs to be built. A popular wireframing tool is Balsamiq software. It allows you to sketch low-fidelity wireframes using ready-made symbols such as the map controls collection (https://wireframestogo .com/bbd2-Map-Controls), which includes many of the patterns introduced in this book.

Mock-ups are static images of the UI that look close to the real app, featuring many of the final design elements such as brand colors and typography. They aren't functional, but most mock-up software such as Figma allows designers to link individual pages to create interactive workflows that demonstrate how a user might interact with your designs.

Design principles

Design principles are a set of considerations that form the basis of usable UIs. The following list summarizes the multitude of recommendations available in the design space:

- **Guide users to solve a problem:** Make it clear what users should do next.

- **Use familiar and engaging components:** Well-established platform conventions make it easier to learn a new UI.

- **Provide clear and self-descriptive workflows:** Let users control the pace and sequence of interactions.

- **Align the UI with the user's mental model:** Conform to the user's expectations and be consistent.

- **Be tolerant of errors:** UIs should be forgiving and assist users in recovering from errors or prevent errors in the first place.

Nielsen Norman Group hosts the following resources for further reading:

- "10 Usability Heuristics for User Interface Design" are broad rules of thumb for interaction design.

- "5 Principles of Visual Design in UX" helps create more beautiful design and increases usability when applied correctly.

Finally, you don't need to be a graphic designer to create a visually pleasing UI; use a design system as described in the next section.

Design systems

A design system is a set of standards that help guide your design and development. It defines the brand identity, including colors and fonts; provides a ready-to-use component library; and documents design principles and best practices. The reasons you should use a design system are as follows:

- Consistency, both visually and functionally

- Scalability for faster and cheaper design and development

- Ability to focus on larger problems

- Unified language within and across cross-functional teams

- Educational tool and reference

The biggest benefit of a design system, such as Esri's Calcite Design System, is the existence of a component library, which is a set of premade UI elements that have the same look and feel and therefore frees you from dealing with difficult design decisions. Because the components are based on well-established patterns, you don't need to reinvent the wheel to build and maintain your own components. They are available and ready to go.

Calcite Design System includes a UI kit, icons, color schemes, and a web component library with UI elements such as buttons, panels, accordions, alerts, and more. Learn more at developers.arcgis.com/calcite-design-system.

Patterns

UI patterns provide the knowledge about common design problems and how to solve them. This knowledge should inform your design decisions and be applied throughout the whole app design process, from UX research to UI design.

The patterns in this chapter focus on general UX best practices. They explain how to provide clear and digestible entry points into your app and how to guide your users and ease them into workflows:

1. **Landing page**

2. **Task oriented**

3. **Empty state**

4. **Focal point**

The second set of patterns focuses on searching for locations and data, which are important functions that allow users to engage with your app. These patterns are common and familiar so that people find them easy to use:

5. **Search**

6. **Location finder**

You can find additional patterns related to this chapter online. These patterns describe how to improve the UX for first-time users and how to add delight to your app:

7. **Onboarding** (www.mapuipatterns.com/onboarding)

8. **Progress indicator** (www.mapuipatterns.com/progress-indicator)

9. **Browse geographies** (www.mapuipatterns.com/browse-geographies)

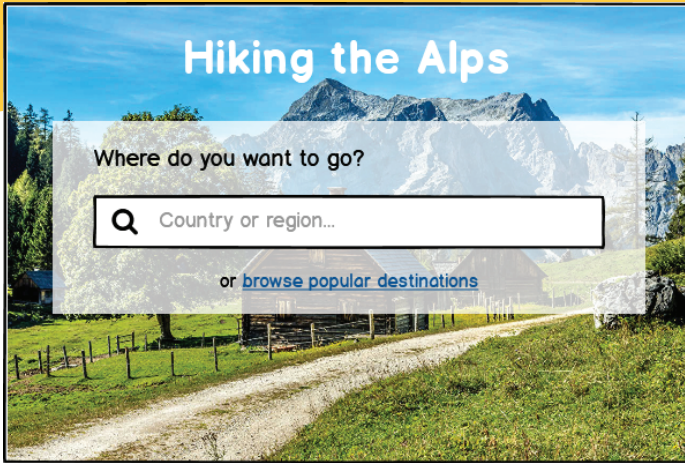10. **Spark maps** (www.mapuipatterns.com/sparkmaps)

Landing page

Figure 1.2. Landing page pattern.

WHAT

The **landing page** (figure 1.2) is your opportunity to create a great first impression and helps set the tone of the app. It also provides a place for users to input their location so the app can start at an extent that is meaningful and focused.

WHY

For years, builders have chosen to show a map when the app starts. Without further input from the user, the initial map extent must default to the smallest possible scale—for instance, Central Europe for any point that falls within. Typically, this results in an unacceptable UX for two main reasons: first, the user wants to view their own location, such as their state, home, or current location. Second, showing all the data at a small scale is overwhelming, feels crowded, takes longer to render, and, most important, is not relevant.

The landing page is where people start their journey with your app. It's the place where they get introduced to the purpose of your app, and, as in real life, first impressions count. Users make up their mind in a matter of seconds whether it's worth spending more time on this app, or else they abandon it and look elsewhere.

Since the landing page is the first touch point with the app, it's a great opportunity to ask users for their initial input, such as the location of interest, and then use this information to funnel them into a workflow that provides relevant next steps or even answers. Using the landing page to introduce users to the app and gather their location will help optimize the subsequent UX and user interactions with the map.

WHEN

Although landing pages are important entry points for any app, they are most often applied to focused, single-purpose, public-facing apps that are used by a wide variety of people with the goal of finding answers to specific questions. Good examples of sites that facilitate landing pages can be found in the travel, recreation, and real estate industries. The main input is a person's location of interest, such as their travel destination or home. This information can be used to create **task-oriented** workflows that show more results and allow further interactions with that location.

HOW

To create a landing page, add an extra page or full-page overlay before the user reaches the actual map app. This page consists of a few elements and a generous layout with bold, emotional images, appealing typography, and concise copy.

The main measure of success for a landing page is whether a visitor becomes an active user and continues engaging with the app or abandons it. The best way to retain users is to research the target audience, understanding who they are and what they want or need when coming to the app, and offer a clear way to solve this end-user need.

Since the goal of the landing page is to capture and funnel the user into a workflow, it needs to be brief, concise, and attractive and offer fewer distractions. Start by removing anything that clutters the UI and distracts from the main goal, such as links to external sources or global navigation. Instead, provide a clear value proposition and include critical elements such as a headline, tag line, supporting image or illustration, and input to gauge the area of interest. Good input mechanisms to find places of interest are **search** or

location finder, and to receive the user's location, use **locate me**. It's common to place **location finder** and **locate me** next to each other in the UI. Another possibility is to provide a series of links to common locations (**placemarks**). These shortcuts are especially important on mobile devices in which typing search phrases can be cumbersome and annoying.

EXAMPLE

With thousands of miles of trails, the state of Ohio offers nearly endless opportunities to explore the outdoors. The aim of the DE**TOUR** app (figure 1.3) is to prepare outdoor enthusiasts with useful and authoritative information for their next trails adventure. The app starts with a **landing page** that allows users to search for trails, recreational land, or cities. The landing page also lists shortcuts to popular destinations as secondary input. Both **search** and **placemarks** direct the user to the main app that is focused on the selected place. The landing page also offers a list of featured routes to spark interest in exploring something new. Selecting a place or route takes the user to a page that shows more details on the trail and its surroundings.
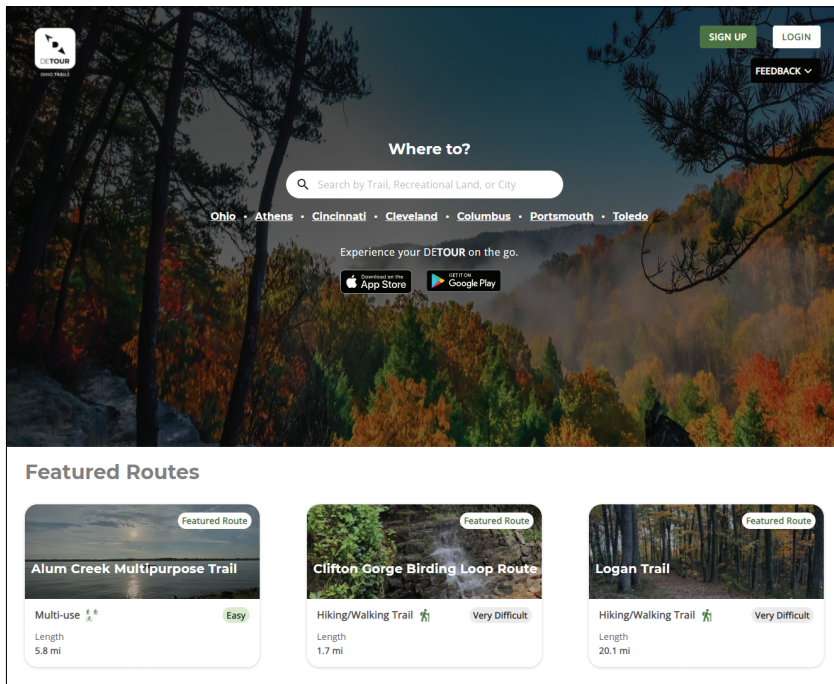

Figure 1.3. Landing page of Ohio's DE**TOUR** trails app.

Task oriented

Figure 1.4. Task-oriented pattern.

WHAT

Task-oriented apps (figure 1.4) provide task-oriented workflows that align with user goals. A task-oriented app is sometimes referred to as task focused or workflow driven. Regardless of terminology, a successful experience is built on useful tasks and guiding users to complete them efficiently.

WHY

Task completion and task success are the main metrics for measuring usability and are essential to the success of an app. A single-purpose app that works well is better than an app that tries to solve too many problems at once and is confusing to users. Users get frustrated or even abandon and leave the app if they can't find and complete what they are looking for. As a result, the task completion rate decreases and affects the usability of the app in a negative way.

WHEN

A good indicator that a map app lacks task-oriented design is when it looks and behaves like a toolbox or Swiss army knife. See the **kitchen sink** pattern, illustrated in chapter 7, "Common Mistakes and How to Avoid Them," for more details. Often, this confusion happens when the app tries to solve too

many problems and offers too many features. This lack of focus inevitably waters down the purpose of the app, and as a result, users are confused where to start, what to do, and how to accomplish their tasks.

HOW

To be task oriented, funnel users into a clear workflow that assists them in successfully completing their task. Avoid scattering tools and functionality across the UI but chain them into a single task-oriented workflow instead. This workflow can be triggered in different ways.

One approach is to provide a single call to action (CTA), such as a button that opens a UI container (for instance, a panel or modal window), with the goal to focus the user on completing the task. A modal window is a child window that opens in front of the main window while blocking the rest of the app. Another way is through explicit action buttons inside an **info pop-up**. This approach is especially effective because you can deduce the intent of the user from their clicking a feature and provide workflows that match this intent and context. Having the workflow readily available in a final panel avoids the need for unnecessary interactions to reach it. **Partial map** layouts work best in this scenario. Another good practice is to embed tools that interact with the map such as **feature selection** right in the workflow so users don't need to look elsewhere to "click the right button to turn the right knob."

Some common task-oriented use cases are discussed in chapter 6, "Building Single-Purpose Apps."

EXAMPLE

The Riverside County Office of Education (RCOE) hosts a custom app (figure 1.5) that allows employees to evaluate school transfer requests by comparing the distances from applicants' home locations (such as Dad's, Mom's, Grand-parents') to the home school and the transfer school. The task-oriented nature of the app provides steps to first select the home school (abbreviated by an *H*) and transfer school (*T*), followed by entering one or more address locations of the applicant (indicated by letters). For each location, the app then calculates the distance to the home and transfer school and shows their respective routes

on the map. Each route is displayed in a different color that also correlates to the location card in the left panel. This layout, in which the main workflow is prominently represented in a panel and the map appears next to it, is called **partial map**. Users can interact with the location cards—for instance, clicking on a location card on the left will zoom the map to the extent of its related routes. An interesting usability detail is that the distance to the target school does not show the actual distance in miles but instead shows the difference between home school and target school—such that a negative number indicates that the distance to the target school is less than the distance to the home school. This seemingly minor detail helps assessors make easier and faster decisions.
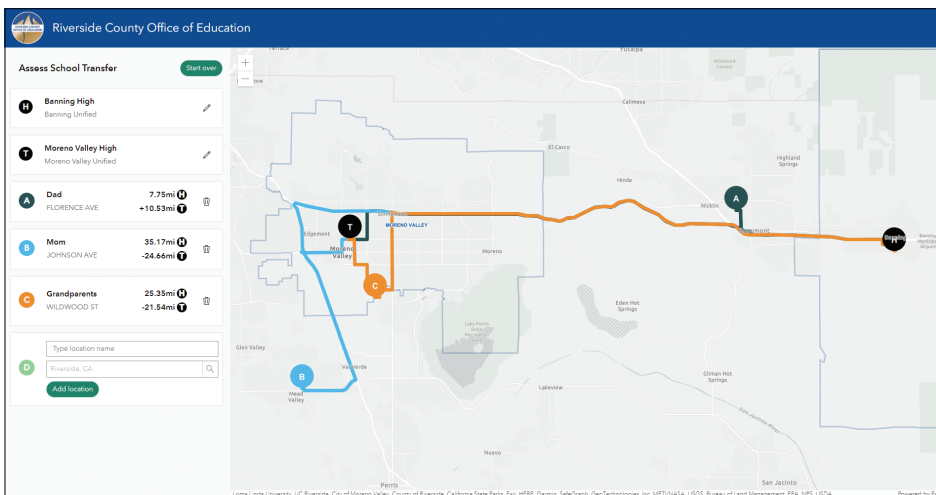

Figure 1.5. App to assess school transfer requests by comparing distances from applicants' homes.