IDI – Mobile Interaction Design

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Contents

1 Introduction

Mobiles and, to a minor extent, wearables, have become an integral part of our lives. They have shaped the way we interact with other people, and are changing how we interact with businesses too.

Most of the general UX and UI guidelines are valid for mobile, but there are many aspects that are particularly different, and user interfaces and interaction design must be changed dramatically in most cases.

Mobile devices and wearables have different requirements when we design applications or services from the point of view of user experience. Mobiles (and to a greater extent wearables), place unique requirements on the design of the user experience. The main limitation is the screen size, which makes difficult the display of information as well as the interaction with elements. As a result, most of the user experience design has to focus in two important aspects *efficiency* and *discoverability*.

But there are other aspects, that do not depend on its form factor, but on their use that make them also quite particular:

- Mobile phones are much more personal: We use mobiles in a much broader set of situations than a regular computer. We will ask them to guide us in a foreign country, or to find good restaurant recommendations on the way, or we may want to pay a certain transaction.
- Entering data is much more complicated. Though we have better ways than in a regular laptop (we can upload images and videos, we can get position and movement tracking…), traditional ways of entering data, e.g. typing, are painful, as compared to using a regular keyboard.

The main reason we want to use it everywhere is because of its portability. Obviously, if we have a computer in our pocket everywhere and the whole time with us, what better way to take benefit of it than using it as much as possible?

The fact that most mobile devices do not sport a regular physical keyboard does not only depend from their form factor. Blackberries have had physical keyboards for many years, but it is also a trend (more screen to watch content), than a real necessity. This makes input awkward, time consuming, and prone to errors.

As a consequence, there are a lot of aspects that come from the physical and technological limitations of mobile devices, but also on how we use them that make them so special. So great care has to be taken in order to design user interfaces and interaction to ease the use of applications in mobile devices. The environment in which users use their mobiles competes for their attention. For example, users may need to focus on driving at the same time than getting directions from the mobile. So facilitating the users' tasks in the application is a must, since the users may not be fully able to focus on it.

As a result, when designing an application, the users should be able to:

- Quickly find what they intend to.
- Interact with the application with the minimum additional cognitive load.
- Be able to process the information with easy-to-digest chunks.

In this document, we provide some guidelines, most of them indicating what to do and what not to do when designing applications for the mobile environments. Note that some of them are just more restricted versions of well-known UX design guidelines.

2 User interface and interaction design guidelines

The following rules will help you design more usable mobile interfaces.

2.1 Keep navigation simple

It is a very obvious concept, but it is of uttermost importance in mobile. And it should be of top priority for every mobile app. After all, if our application provides awesome features that are difficult or impossible to reach, these would be end up being useless. Since there will be little room to add navigation support elements such as breadcrumbs, and due to the impossibility of having long menus, we have to think navigation carefully. Take advantage of elements such as tabs, and make the navigation as self-evident as possible.

Some elements to take into account:

- **Ensure navigation feels familiar to users:** Users will feel more comfortable when the application meets their expectations. Do not use navigation patterns that are unfamiliar to the target audience. Be prudent with gestures, since these typically do not come with visual cues to indicate them, and the users may be less familiar with it.
- **Design good information architecture:** Information architecture is about organization of information in a logical and clear way. In order to facilitate the navigation, the user should spend the minimum number of steps to reach their destination.
- **Navigation should not grab more user attention than necessary:** The important element in your app is the content, not the navigation. Ensure you do not prioritize visual representation of the navigation over the content.
- **Ensure the users know their location:** This is a pretty basic rule from UX design. People should always know where they are in your application so that they can navigate successfully.
- **Strive for consistency:** Another basic rule of UX design, the visual elements for navigation should stay consistent for all the application. And if possible, with the OS widgets. Never forget that the users will spend more time using other applications than yours, so use their previous knowledge in your advantage.

- **Provide a clear path:** If 90% of your users will look for a certain element in your application, do not bury it under multiple other options. Amazon's users are going to shop most of the time, Amazon's app will not make the principal focus of attention other services such as Prime reading or Amazon Web Services.
- **Design with a clear visual hierarchy:** Use of font sizes, as well as layout may help you direct the users' attention to the right elements.

2.2 Design finger-friendly tap-targets

Probably everybody is familiar now with the so-called *fat finger problem*. Since we interact with mobile screens with our fingers instead of a stylus nowadays, the need of targets with a size big enough for us to tap is prevalent (see Figure 1).

Figure 1: Target size of 10x10mm is a good size to facilitate easy tapping.

Taking into account Fitts' law, the larger the elements, the easier to reach. However, we are very often limited by the available space in mobile. Opposite to desktop, where mouse pointing is highly precise, and thus targets can be reduced significantly, on mobile reducing the size is prone to errors and missclicks. In addition to this, the space between targets needs also be large enough to avoid clicking on the wrong element.

2.3 Progressive Disclosure & minimizing cognitive load

Cognitive load refers to the amount of brain power required to use the app. The human brain has a limited amount of processing power, and when an app provides too much information at once, it might overwhelm the user and make them abandon the task.

As a result, and in line to what we already mentioned in the first case, since it may be overwhelming (and it is not desirable) to show as much information as possible,

a good practice is to use the technique called progressive disclosure. The rationale behind that is that users do not need to have information or action visible before needing it. Progressive disclosure is an opportunity to reduce cognitive load and to improve the comprehension of the interface.

2.4 Make text legible

In many cases, most of your application contents will be either text or images. In the case of text, you should ensure it is legible and understandable for your users. You have to take into account font types and sizes. Some recommendations:

- Choose a typeface that works well in multiple sizes and weights to maintain readability and usability in every size. Typically, platforms will offer a default font (e.g. Google offers Roboto and Noto, while Apple uses San Francisco family).
- Use legible font sizes: For instance, text should be at least 11 points so that users can read it at a typical viewing distance without zooming (see Figure 2).
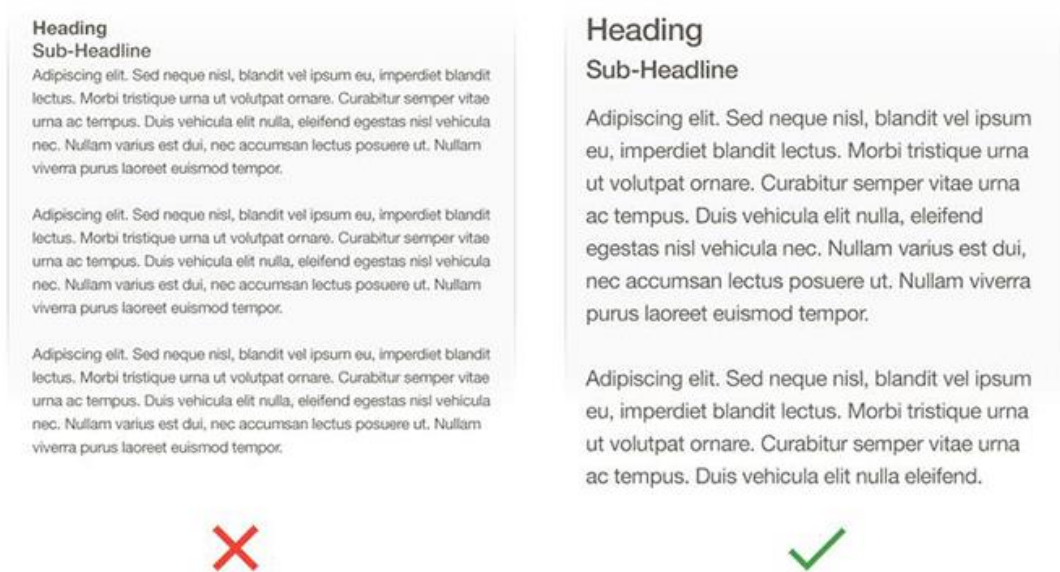
Figure 2: Small font size, like on the left, causes eye strain.

Besides font sizes, contrast is also important. Insufficient contrast makes text blend in with the background.
The vocabulary is also important using jargon, acronyms, brand-specific terms, cultural-specific axioms or technical terminology can make people not understand your text. It is better to use simple and direct language to maximize clarity.

2.5 Provide feedback on interactions

Whenever we interact with UI widgets, two elements come into play: user input, and computer reaction to it. Some tasks require more time than other, but users should never be left guessing whether the interaction was received by the computer. So it is essential to provide some sort of feedback in response to every user action. Nowadays, most platforms will help you use the so-called microinteractions. Microinteractions are animated responses to user's gestures. Accompanying these microinteractions with other visuals such as loading indicators helps providing the feeling that the application is responsive, and also informs the user that something in response to their action is being performed.

2.6 Keep content to a minimum & reduce clutter

Reducing the clutter is one of the major recommendations for mobile. Clutter is one of the worst enemies of good design. By cluttering your interface, you overload users with too much information. Clutter is bad on desktop, but is a much more important problem in mobile, due to the reduced space, and the need of larger targets for us to tap without mistakes. To reduce clutter one must make an important prioritizing effort:

- Keep content to a minimum: Present the user with only what they need to know.
- Keep interface elements to a minimum: Simple designs will simplify the learning curve (see Figure 3).
- As an alternative to provide more features, use progressive disclosure.
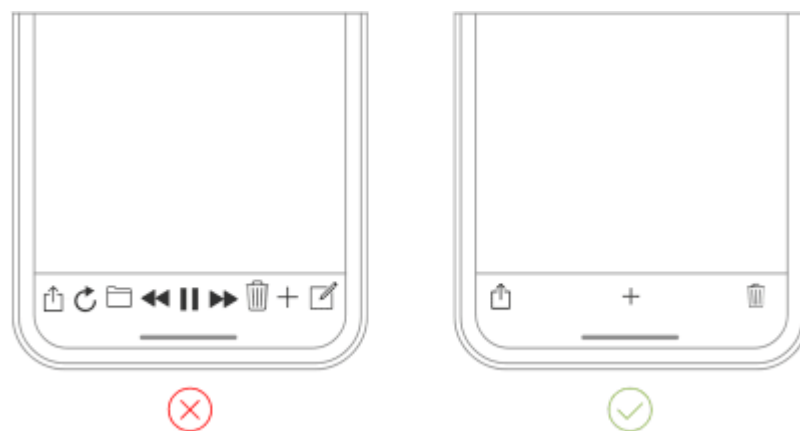
Figure 3: The bottom menu bar on the left leaves no breathing room, and makes interaction more difficult.

Of course, keeping the content to the minimum somewhat competes with the need of your application to provide a higher number of features. The latter will make your application more attractive to users, unfortunately this may affect user experience. A couple of ideas to keep in mind are:

- Strive for minimalism: Focus on the content that is valuable for your users and remove unnecessary elements that do not support user tasks. Minimal use of decorative elements such as gradients and drop shadows will help keeping the interface light and simple.

- **Prioritize one primary action per screen:** Try to design each screen for one thing and one thing only.

Note that, as in a presentation, you need to define clearly what message you want to communicate at each point.

2.7 Reduce the inputs required from users & offload tasks

Many applications will require more or less demanding input form the user. From complex onboarding processes where the user needs to provide all sorts of personal information such as in medical applications, to other shorter, but also painful tasks such as logging on any platform.

In China for example, where most users have an accounts associated with mobile phone numbers instead of e-mails, the use of techniques such as SMS sending a one-time password (OTP), greatly facilitates logging in many services. Another very popular alternative is the use of QR codes. Since most of the users in China have WeChat tool installed and it incorporates QR recognition, it is also a simple to use alternative to requiring the memorization of dozens of different passwords.

In these and other cases, it is better to look for anything in the design that requires user effort and look for alternatives. From default values to previously entered data anything may be useful to reduce user's effort. In contrast to desktop, were we type with efficiency, in mobile this is still a painful experience, so tasks such as filling forms are undesirable in mobile.

Some recommendations:

- Keep forms as short as possible by removing any unnecessary fields. The app should ask for only the bare minimum of information from the user.
- Provide input masks. Field masking is a technique that helps users format inputted text. A mask appears once a user focuses on a field, and it formats the text automatically as the field is being filled out, helping users to focus on the required data and to more easily notice errors.
- Use smart features such as autocomplete.
- Dynamically validate field values. It is frustrating when, after submitting data, you have to go back and correct mistakes. Whenever possible, make the checks as soon as possible so that the user is able to correct them right away.
- Customize the keyboard for the type of query. Display a numeric keyboard when asking for phone number, and include the @ button when asking for an email address. Ensure that this feature is implemented consistently throughout the app, rather than only for certain forms.
- When possible, present choices instead of input fields, since choosing may be simpler than typing.

If a task contains a lot of steps and actions required from the user's side, such as onboarding processes, it's better to divide such tasks into a number of subtasks. This

principle is extremely important in mobile design because you don't want to create too much complexity for the user at one time. This is good both from the data entry point of view, and from the cognitive load reduction point of view.

2.8 Don't make users wait for content

Mobile connections are not stable as hardwired ones, and are not as fast. Therefore, you should always provide content as soon as possible. Bringing the users to a blank screen, shown when content is loading, can make it seem like your app is frozen, resulting in confusion and frustration. In order to avoid this, you should use skeletons, placeholders, etc. There is a vast literature on optimizing image loading on web that you can use to get ideas from in order to avoid this problem.

2.9 Gestures

We interact with mobile devices in different ways than with desktop, we use touch, gestures and voice. A great advantage, from the visual design point of view, of gestures is the lack of physical space to place an input widget. As a result, mobile designers have flirted with the idea of using gestures to increase functionalities without the cost of visual space.

But gestures come at a price: **Gestures are hard to remember and use**. There are several elements that we must take into account when using gestures to interact with the device. Typically, three attributes are used:

- Location where the gesture is initiated.
- Length of the swipe.
- Direction of the swipe.

UI changes are always unpopular with existing users. Thus, moving to a gesture-based interaction control has its dangers. However, big companies such as Apple have seen this as a golden opportunity to maximize the real state devoted to contents. Eventually, the users will adapt to the new features, and end up learning how to interact with those devices. However, the way that those gestures have been incorporated in OS such Apple's iOS make the learning process slower than needed. For instance, iPhone X and iPhone 8 and older have different meanings for the same gesture (note that iPhone X has no home button and iPhone 8 and older ones still have it). For example swiping down from the top right corner will invoke the Control Center in iPhone X while it will show notifications in iPhone 8.

As a result, using gestures will increase the cognitive load, and make learning process as well as interaction typically slower.

Therefore, if using gestures in your app, try to keep them standard, that is, use the standard ones for analogous tasks in your application. And in the case of providing

non-standard actions, avoid using standard gestures, since this would lead to confusion and increase of complexity.

2.10 Generate continuous integrated experiences

In general, we can see mobile interaction as a part of a more complete experience with an application or service. A typical user will probably interact with the same applications in different environments, and we should design taking this into account. Some tasks such as synchronizing user's current progress may be highly desirable. For example, if a user has started a shopping process on one device, being able to finish it in another is good to provide a seamless experience.

2.11 Don't replicate the web experience on apps

Mobile devices and interfaces have evolved differently than web-based interfaces. As a consequence, users expect certain interaction patterns and interface elements in mobile apps. Do not try to replicate the same web experiences in mobile, not only because they will have usability problems, but also because we have to be consistent with users' expectations.

For the same reason, it is also almost never a savvy option to bring the user to a browser to complete some tasks. If necessary, use an in-app browser. Otherwise, the user may never return to the app.

References

This list of references has been used to generate this document, and provides many important knowledge for mobile UX:

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