Mobile App Design Basics

EESTEC App Challenge
25/4/2023

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The question is...

https://youtu.be/bSLhQA2OQB4?t=1714

Bill Buxton, 2015
Now that we can do anything...

• What should we do?
• How should it work?
Introduction

• The motivation for interaction design is to support use in three ways:
  • **useful**: accomplish a user task that the user requires to be done;
  • **usable**: do the task easily, naturally, safely (without danger of error), etc.;
  • **used**: enrich the user experience by making it attractive, engaging, fun, etc.

• “…The Interface is *not something that can be plugged in at the last minute*; its design should be developed integrally with the rest of the system. It should not just present a “pretty face”; but should support the tasks that people actually want to do, and forgive the careless mistakes.” (Dix et al. 2004)
Useful: Heckel’s Law

- “The quality of the user interface of an appliance is relatively unimportant in determining its adoption by users if the perceived value of the appliance is high.”
  - Although the usability of the UI is important, the overriding concern is the usefulness (value) of the device itself.
- Heckel’s inverse law
  - “The importance of the user interface design in the adoption of an appliance is inversely proportional to the perceived value of the appliance.”
  - That is, if a difficult user interface acts as an inhibitor to the uptake of an appliance, then the appliance probably does not have enough perceived value to be useful.
Usable: the human user

- The user’s goal is NOT to interact with a computer
- The user wants to ACHIEVE GOALS
- Goals will be achieved _using a computer_, if:
  - _it can’t be done more efficiently in another way_
  - the use of the computer offers a pleasurable experience
- Users will put up with bad experiences _if_ the tool is the _absolute only way_ they will achieve their goal
  - _... but this is not an excuse for providing bad experiences!_
Enter User Experience (UX)

- Design: “to plan and make (something) for a specific use or purpose.”
  - User Interface Design
    - Focused on the (not only) visual design of the interface through which users interact with a product or system.
  - User Experience Design
    - Focused on the holistic experience around a product or service, taking into consideration the user, system, and context.
User Experience

**Surface:**
visual design

**Skeleton:**
interface design, navigation design, information design

**Structure:**
information architecture, interaction design

**Scope:**
functional and content requirements

**Strategy:**
user needs, business goals

UI Design

UX Design

Concrete

Abstract
The Double Diamond model

- Divergent thinking
  - explores many possible solutions and generates novel ideas.
- Convergent thinking
  - analyzes, filters, and focuses ideas and leads to decisions.
Product Development Lifecycle
Design Thinking

Inspiration
- Empathize

Ideation
- Define
- Ideate

Implementation
- Prototype
- Test
Good Usability

- Not determined by just one or two constituents, but influenced by a number of factors, which interact with one another, in sometimes complex ways (Booth 1989)

- Usability criteria
  - Learnability
  - Flexibility
  - Robustness
  - Efficiency
  - Memorability
  - Errors (and recovery)
  - Satisfaction

Eason’s causal framework of usability (1984)
Good UX

- **Useful**: fulfills a user’s needs
- **Usable**: easy to use and understand
- **Desirable**: visually attractive and succinct
- **Findable**: easy to navigate and find information
- **Accessible**: users with disabilities can use the product
- **Credible**: the product, company, and services are trustworthy
- **Valuable**: delivers business value

Peter Morville’s UX Honeycomb
User Research

• *User research* is the systematic study of target users of a product or interface to understand their behaviors, needs, and motivations.
  • Can happen at every stage of the design process to inform decisions.

• Quantitative research
  • methods that can measure objectively *(numerically)*, such as surveys, analytics, and A/B testing.

• Qualitative research
  • methods that can measure subjectively, to examine *why* users behave the way they do, such as interviews, focus groups, and ethnography.

• You need BOTH!
  • As part of the discovery process
  • As part of the design process
  • As part of the evaluation process
Learn the user

- User Personas
- User Journeys
- Storyboards
Prototyping

• First, define your information architecture!

• *Information architecture* is the organization, prioritization, and presentation of information within products, websites, and other software applications.

• Effective information architecture is important
  • it allows users to complete tasks with the least effort required.
  • Example: Sitemap

• User workflows
  • Paths taken through the information architecture to complete a task
Prototyping

- Low-fidelity
  - Paper drawings
  - Wireframe mockups
- High-fidelity
  - Computer designed
  - True to scale
  - May contain interactive elements
Some tools

• Paper + Pencil (duh)
• Draw.io (wireframing)
• Freehand (online collaboration)
• Marvel (rapid prototyping + interaction)
• Figma (hi-fi mockups)

https://www.youtube.com/shorts/AJV74Nj6vlc
Mobile interaction design

- Users install your app because they need to solve a problem.
- Designers should
  - think about the problem their users will try to accomplish using the app,
  - focus on their key goals
  - remove all obstacles from their way
Mobile Challenges

- **Small Screens**
  - The content displayed above the *fold* on a 30 inch monitor requires 5 screenfuls on a small 4-inch screen.
  - Thus, mobile users must
    - incur a **higher interaction cost** in order to access the same amount of information;
    - rely on their **short-term memory** to refer to information that is not visible on the screen.
  - It’s thus not surprising that **mobile content consumption is twice as difficult**.
  - **Interaction** (accurate target selection) is also much more difficult
Mobile Challenges

- **Portable = Interruptible**

- Attention on mobile is often **fragmented** and mobile device **sessions are short**.
  - Average mobile session duration is 72 seconds. (Desktop=150 seconds)

- Save state
- Transfer state
- Allow resumption on other platforms
- Prioritise essential
- Simplify interactions
Mobile Challenges

- Variable connectivity
  - Loading times
  - Task failure
  - Network usage costs
Key Laws of UX in Mobile Design

• Fitts’ Law
• Hicks’ Law
• Jakob’s Law
• Miller’s Law
• Tesler’s Law
• Zeigarnik Effect
Fitts’ Law

“The time to acquire a target is a function of the distance to and size of the target.”

- Smaller targets need more time to acquire
- Further away targets take more time to acquire

- Use it to speed up interactions
- Or to slow them down intentionally!

\[ MT = a + b \cdot \text{ID} = a + b \cdot \log_2 \left( \frac{2D}{W} \right) \]

- \(a\) and \(b\) are constants
- \(\text{ID}\) is the distance from the starting point to the center of the target
- \(\text{W}\) is the width of the target

The average time to complete the movement.
Hick’s Law

• “The time it takes to make a decision increases with the number and complexity of choices.”
  • A poor UI design presents too many choices and asks people to remember too many things.
  • **Mobile UIs need not be simplistic but should be simple to use.**
Jakob’s Law

• “Users spend most of their time on other sites or apps.”
  • Designers can simplify the learning process by providing familiar design patterns.
  • People expect a product to work like all the others.
Miller’s Law

• “The average person can only keep around seven (7±2) items in their working memory.”
  • When this rule is disregarded, people are forced to think more than they should have to.
  • Frustration and decision paralysis (aka “overchoice”, or cognitive overload).
Tesler’s law

- “All processes have a core of complexity that cannot be designed away and therefore must be assumed by either the system or the user.”
  - Ensure as much as possible of the burden is lifted from users by dealing with inherent complexity during design and development.
  - Take care not to simplify interfaces to the point of abstraction.
  - Minimalist design is OK, reducing complexity is OK, but there is a certain amount of complexity that cannot be decreased.
Zeigarnik Effect

• “Uncompleted tasks are easier to remember than completed ones.”
  • Our brain has a powerful need to finish what it started.
  • Use visual indicators for complex tasks that take longer
  • Use progress measures to encourage engagement
  • Invite discovery by providing clear indicators of additional content
Practical tips (1)

• **Cut Out The Clutter**
  • “Perfection is achieved when there is nothing left to take away.”
  • A simple rule of thumb: **one primary action per screen.**
    Every screen you design for the app should support a **single action of real value** to the person using it.
Practical tips (2)

• Make Navigation Self-Evident
  • Clarity. App uses familiar navigation patterns and each navigation element (such as icon) lead to the proper destination.
  • Consistency. Global navigation controls always located in the same area, no matter what part of the app.
  • Visible. To navigate successfully, the user should always be able to answer the question “Where am I?”
Practical tips (3)

- **Design Finger-friendly Tap-targets**
  - Create controls that measure have a size 7–10 mm so they can be accurately tapped with a finger.
  - Such target allows the user’s finger to fit nicely inside the touch target — users will see the borders of UI controls and will know that they’re hitting the target accurately.
  - Also ensure that there is good amount of spacing between tap targets.
Practical tips (4)

• **Text Content Should Be Legible**
  - Text should be at least 11 points so it’s legible at a typical viewing distance without zooming.
  - Improve legibility by increasing line height or letter spacing.
  - Generous whitespace not only make your text more readable but will make your interface more inviting.
Practical tips (5)

• **Make Interface Elements Clearly Visible**
  
  • Use sufficient colour contrast to enable reading in sunlit environments.
  
  • Small text should have a contrast ratio of at least 4.5:1 against its background.
  
  • Large text (at 14 pt bold/18 pt regular and up) should have a contrast ratio of at least 3:1 against its background.
  
  • Icons or other critical elements should also use the above recommended contrast ratios.
Practical tips (6)

- **Design Controls Based on Hand Position**
  - 49% of people rely *on a one thumb* to get things done on their phones.
  - Place top-level menu, frequently-used controls and common actions to the green zone of the screen.
  - Place negative actions (such as delete or erase) in the hard to reach red zone, because you don’t want users to accidentally tap them!
Practical tips (7)

• **Minimize Need For Typing**
  • Typing on a mobile is a slow and error-prone process.
  • Keep forms as short and simple as possible by removing any unnecessary fields.
  • Use auto-complete and personalized data where appropriate so that users only have to enter the bare minimum of information.
  • Use on-device sensors (GPS, camera, accelerometer) to provide input
  • Use the appropriate keyboard type by specifying input field restrictions!
Further reading & sources

• https://www.codecademy.com/learn/intro-to-ui-ux
• https://medium.com/utopix/introduction-to-the-mobile-app-design-
ea7ea7f55eb4
• https://uxplanet.org/mobile-ux-design-key-principles-dee1a632f9e6
• https://uxdesign.cc/boost-ux-with-mobile-ux-design-principles-and-
best-practices-907e4f9fdd5d
• https://www.thinkwithgoogle.com/marketing-strategies/app-and-
mobile/principles-of-mobile-app-design-introduction/
• https://www.nngroup.com/articles/mobile-ux/
• https://laws-of-ux.com/