MOBILE COMMERCE

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Development of Mobile Applications

NM-AIST

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Learning Objectives

- Explain and apply principles of designing mobile applications while taking into account the limitations of mobile communication technologies.
- Know approaches of mobile web best practices and their effects on user acceptance.
- Know the basics of design principles/patterns/guidelines.
- Explain and apply basic properties of application development with Android.

Heterogeneities and Limitations

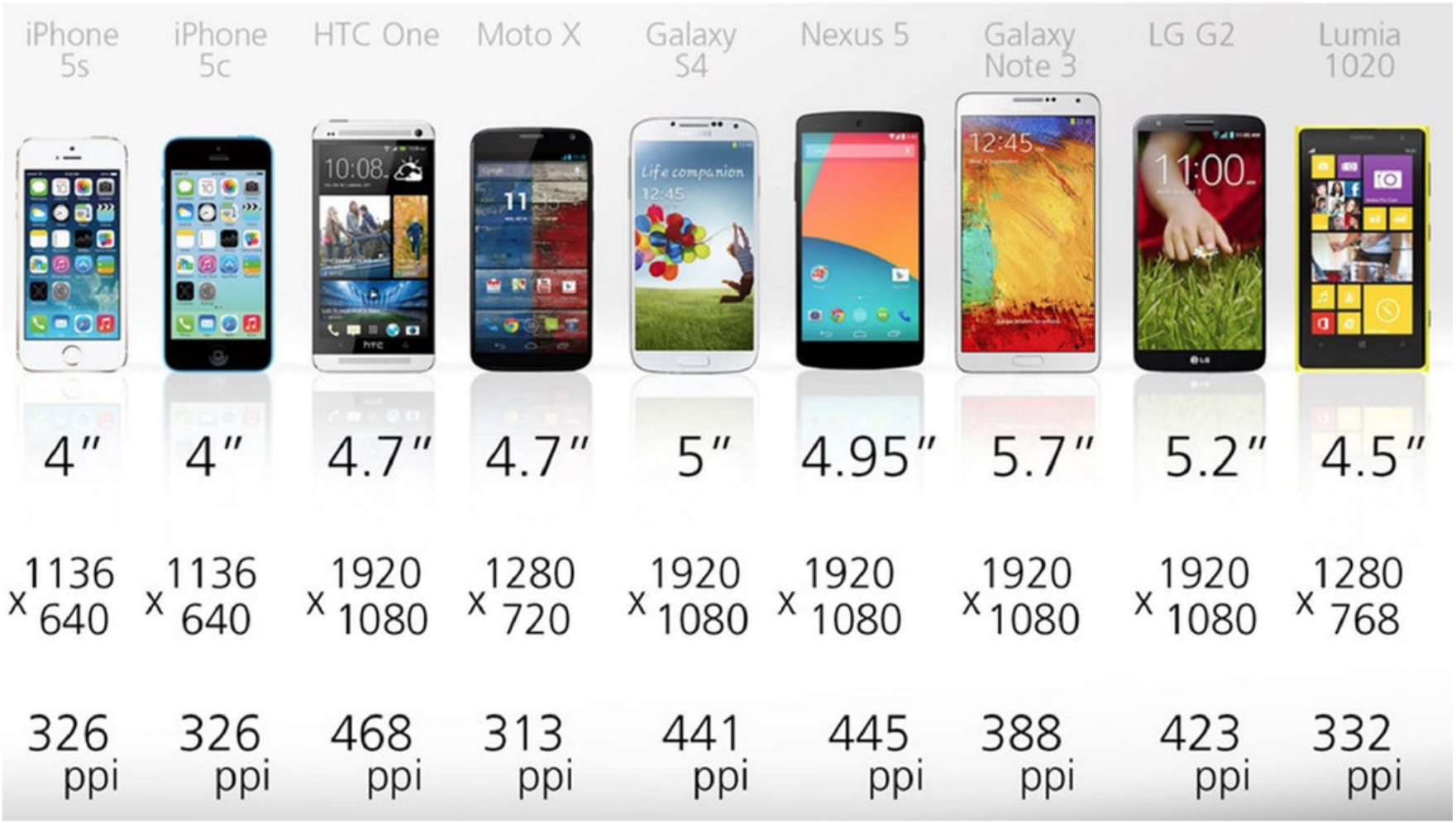
Target devices

- Presentation: Resolution, display sizes, browser types
- Handling: Numeric keypad, touch screen etc., voice input?
- Performance/Memory: Processor performance vs. battery life
- Memory: RAM and cards

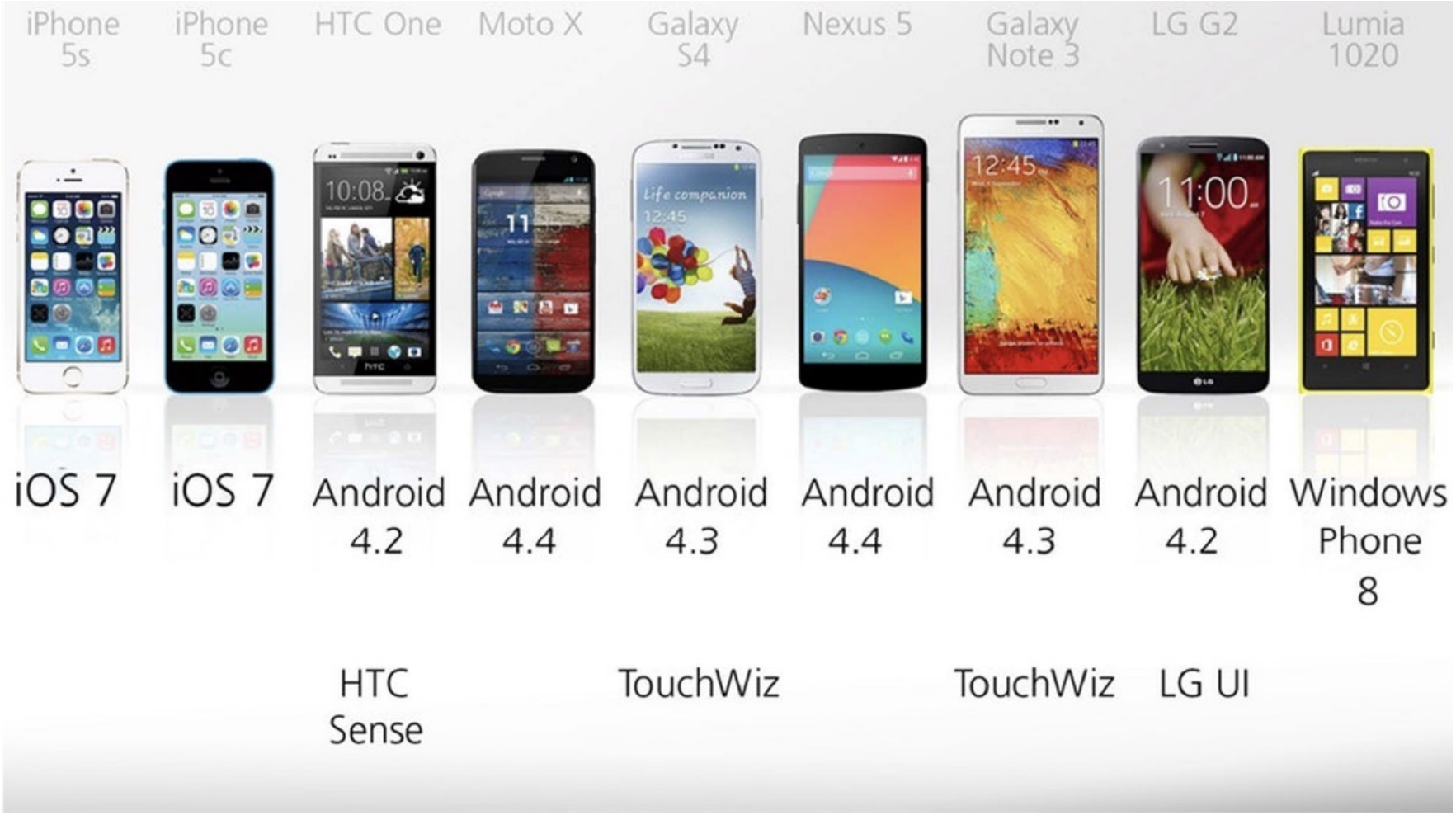
Data transfer

- Bandwidth
- Online vs. Offline synchronization

Presentation Limits (1/4)



Presentation Limits (2/4)



Presentation Limits (3/4)

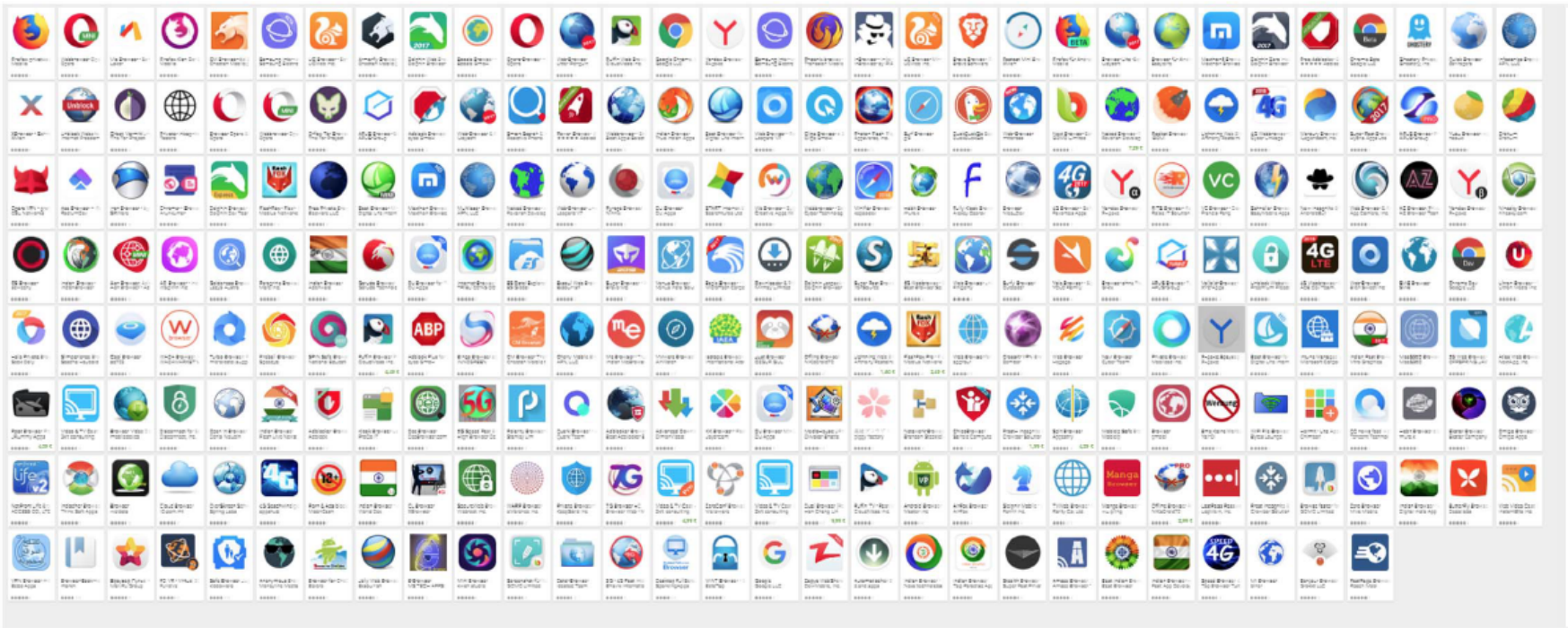
Presentation options of the end device

- Different types of mobile devices
- Different applications, possibly fundamentally different functional scope and presentation

Presentation Limits (4/4)

Presentation options of the end device

- Different implementations with comparable end devices
  Heterogeneous displays and Microbrowser

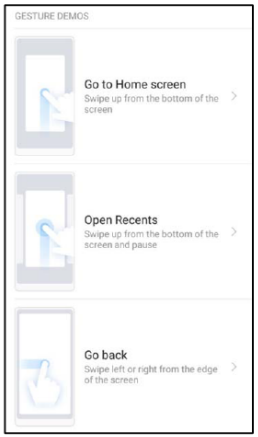


Handling Limitations (1/2)

Input options

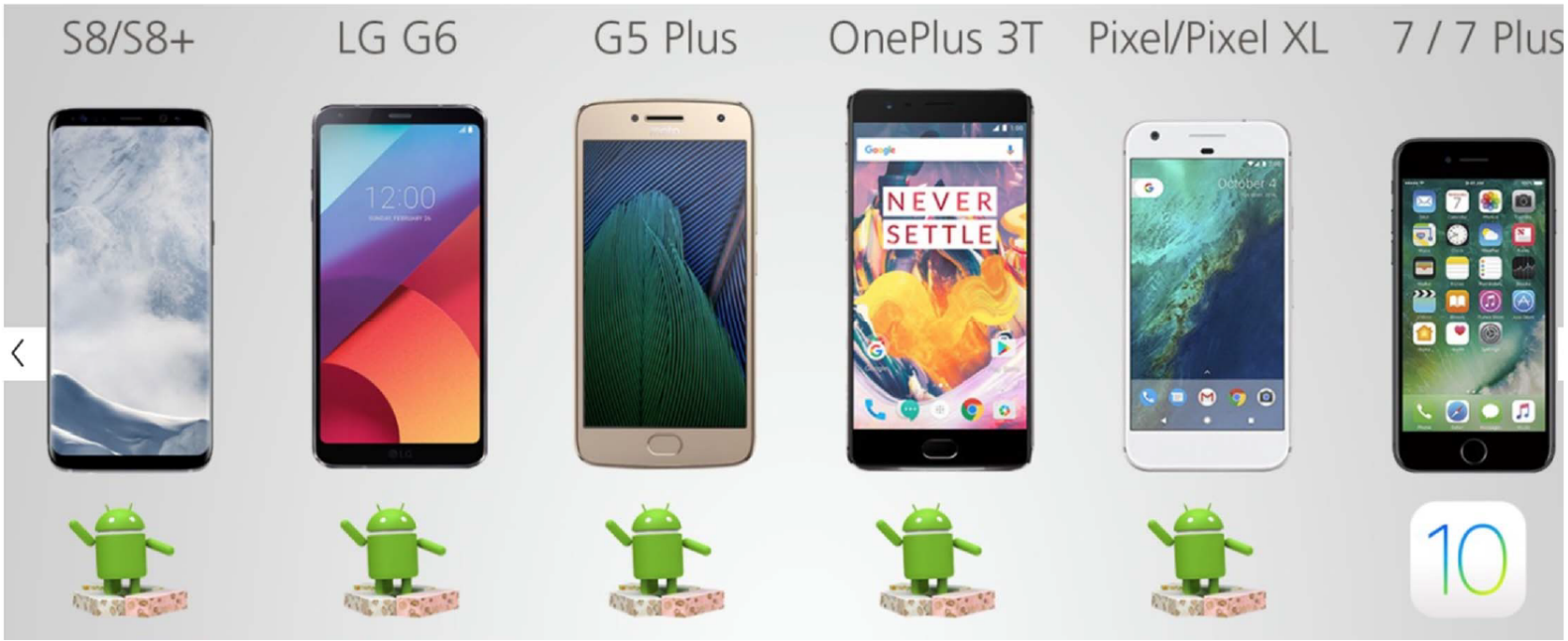
- Numeric keypad and selection keys
- Mouse functionality through finger or pen input
- Handwriting recognition/character input
- Virtual keyboard (touchscreen)
- Camera, PAN techniques
- Voice input
- Gesture control
- Fingerprint sensor (security)

Handling Limitations (2/2)



A Chaotic, Dynamic Market

- A chaotic, confusing, dynamic, user-unfriendly market: Power, Performance, Display, Battery, Sensors, Memory, Inputs, Operating System
- The Web itself helps sometimes a little:
  `https://www.productchart.com/smartphones/`



Data Transmission Limitations

Bandwidth

- Consider available bandwidth
- Optimize application for response time
  - Heterogeneity: scale functionality according to bandwidth if necessary

Type of data transfer

- Use of the device's local memory (for offline operation)
- "Always on Air" solutions (online synchronization)

Mobile Web Best Practices und Usability

Development of mobile Applications: Analysis of the crucial added value of the ...

- Application itself
- User preferences
- Typical usage scenarios (use cases) and frequency of use

Identification of the target group

- Deduct main target device, secondary target devices

Decision for development method (native, web-based, hybrid)

Scalability of the application

- The same application with different functions and display types for different device categories. Example: iPhone and Android based version of an application
- Limitation of effort through the use of modern web engineering techniques, taking into account mobile web best practices

Mobile Web Best Practices - General

Published by various organizations

- W3C, dotMobi, Luca Passani, etc.

"Guidelines" or "Recommendations" for the development of mobile applications

- General functionality
- Style guides for presentation: size, colour, navigation etc.

Focus on the provision of existing content via mobile devices

Mobile Web Best Practices (1/3)

Thematic consistency:

- "One Web" principle: the same content should be made available on different devices

Capabilities:

- Do not implement the lowest common denominator, but take into account the capabilities of all devices (as far as possible)

Balance:

- Balanced ratio between the number of links on a page and the number of sub-pages

W3C recommendation - `http://www.w3.org/TR/mobile-bp/`

Mobile Web Best Practices (2/3)

Suitable (adequacy):

- Which content is really interesting for the mobile user? Less is often better! NO overload!

Scrolling:

- Scrolling should only ever be possible in one direction (vertical or horizontal) - everything else is confusing

Tables Support, Nested, Layout and Alternatives:

- Generally try to avoid tables if possible
- If tables have to be used, an alternative should be available (tables alternatives)
- NEVER use nested tables
- Do not use tables to “layout” the page (tables layout)

Mobile Web Best Practices (3/3)

Images specify size and images resizing

- The size of an image should be specified in the markup
- To reduce loading times, the size of images on the server should be changed - not on the client (after loading ...)

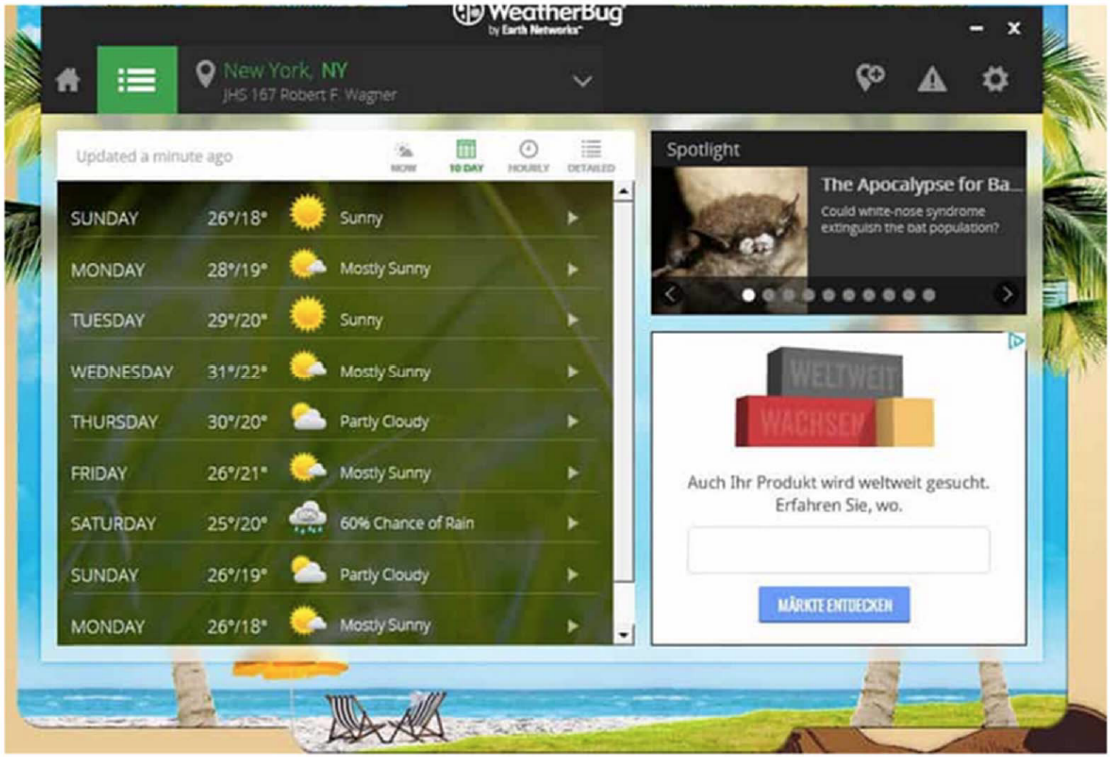
Provide defaults:

- Default proposals of standard values for easier data entry
- E.g. when entering a date: “yesterday”, “last week” etc.

Page Title:

- Assign a short page title to create simple bookmarks

Some "Questionable" Examples (1/5)



Source: Cubicle Ninjas

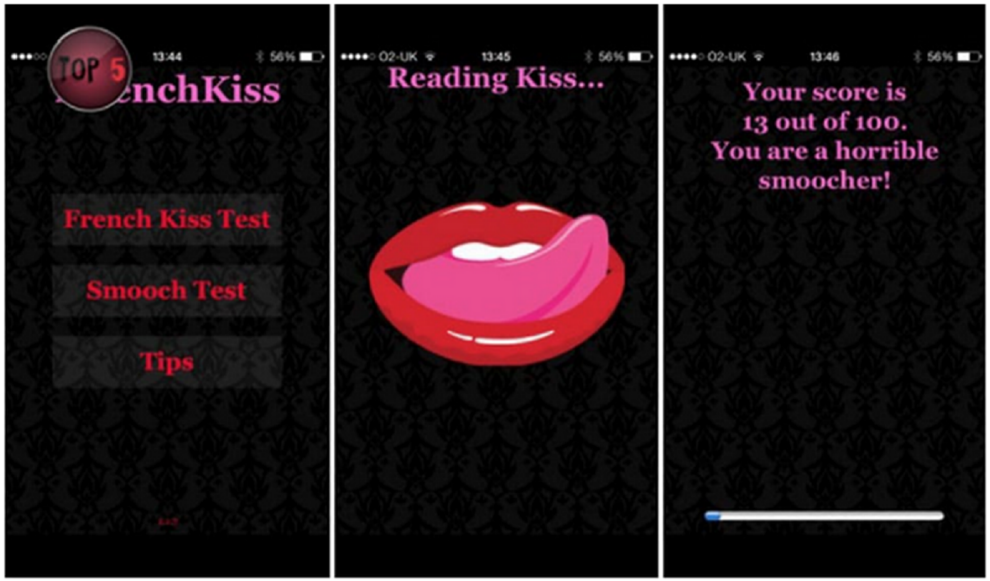
- Main screen is way too busy, and with ads clustered on the side
- People prefer something that is clean and sleek, especially in a single-purpose app

Some “Questionable” Examples (2/5)

Source: Cubicle Ninjas

- The color scheme doesn’t work at all
- Information overload

Some “Questionable” Examples (3/5)



Source: Cubicle Ninjas

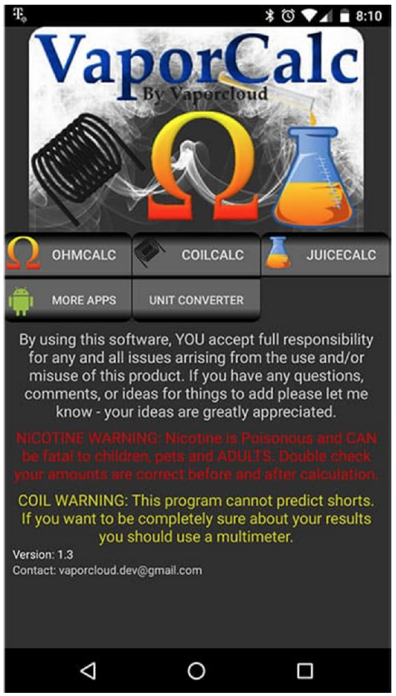
- Hygiene issues of an app that rates your kissing
- Suffers from an ugly design that has poor color choice and even a worse user interface

Some "Questionable" Examples (4/5)

Source: Cubicle Ninjas

- Impossibly ugly mobile apps are designed with a putrid color scheme
- The layout with all of the information crushed up together on a single screen

Some "Questionable" Examples (5/5)



Source: Cubicle Ninjas

- Contains much useful information, but everything looks thrown together and sloppy
- Not the look you want if you want your users to trust your content

Design Principles and Guidelines

Apple Human Interface Principles

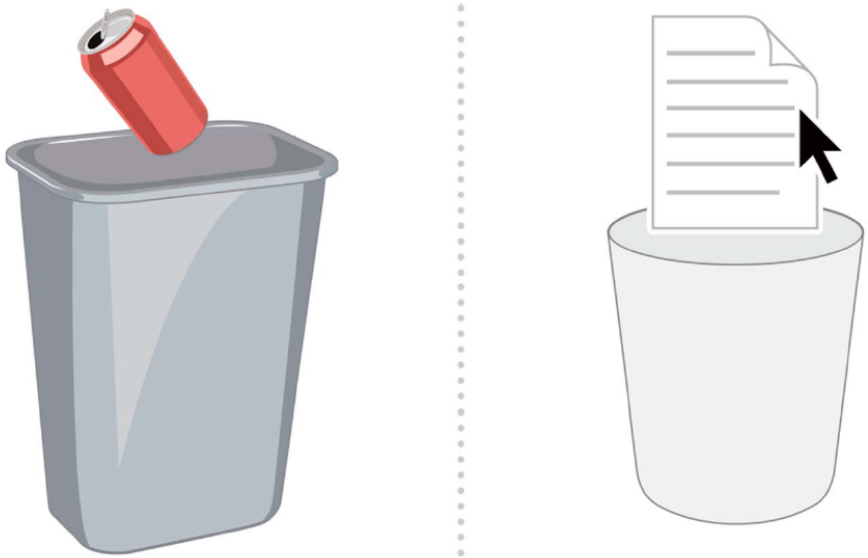
- Mental Model
- Consistency
- Direct Manipulation
- Feedback and Communication
- Metaphors
- User Control
- Forgiveness

Look also for - `https://developer.apple.com/library/mac/documentation/userexperience/conceptual/applehiguidelines/HIPrinciples/HIPrinciples.html`

Mental Model of Users

Applications for productivity

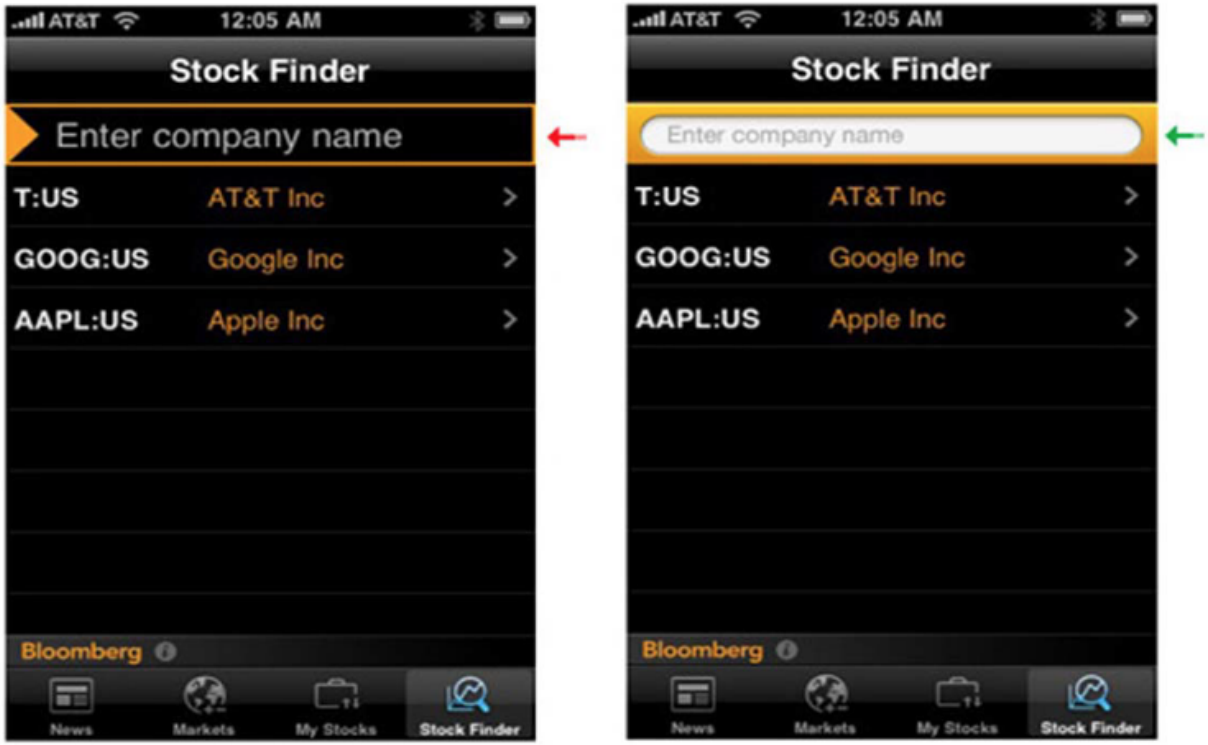
- A simple GUI with simple icons highlights the essential functions
- User shall memorize the icons - complex pictures are inappropriate
- Do not change icons too much (Greying is OK)



Consistency

Consistency ...

- ... with platform standards
- ... within an application (and along different versions)
- ... in terminology

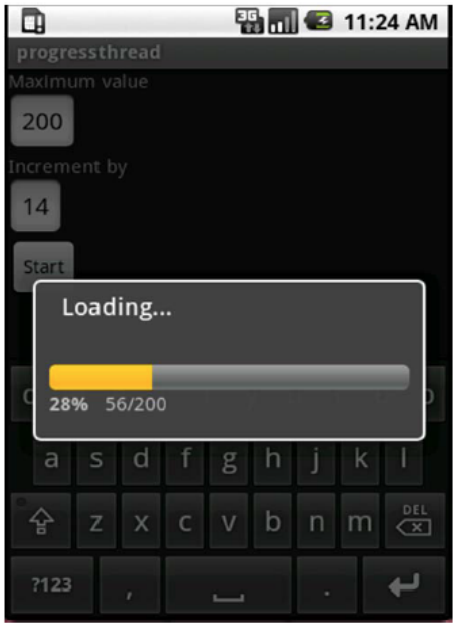


Direct Manipulation User Interface

- Direct interaction or “virtual grabbing” of visible “objects”
- Effects of interactions should be immediately visible : Immediate Response

Feedback and Communication

Users expect direct feedback that an interaction has been understood and is being carried out (hopefully) correctly



Metaphors

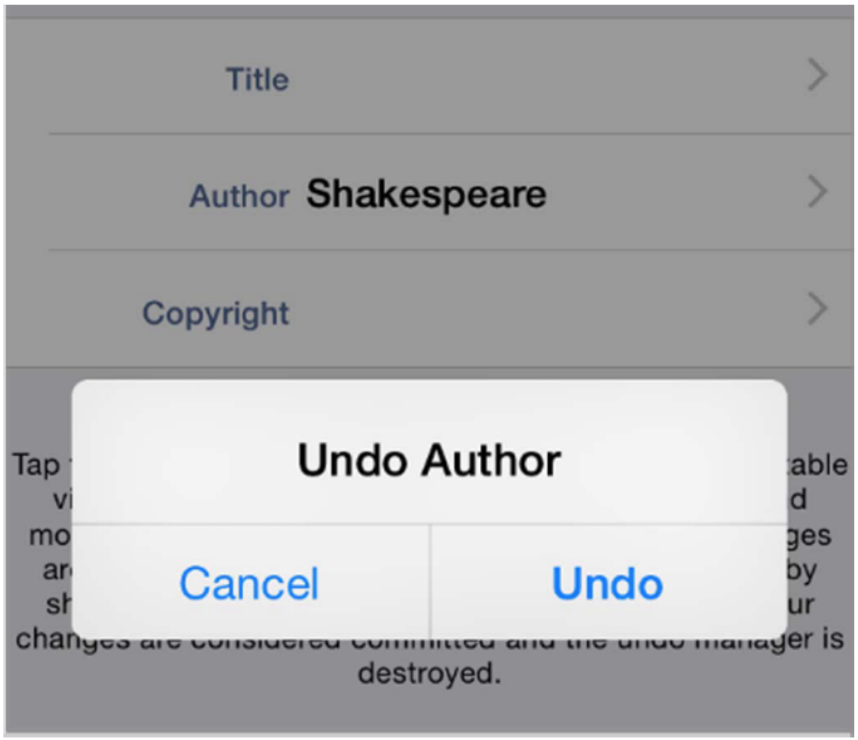
- Virtual objects and actions as metaphors reflect the counterparts from the real world
- Mental transfer of experience
- Without any restriction (e.g. virtual folder without limited storage capacity)

User Control

- Request confirmation and offer the opportunity to cancel actions
- Good balance between system assistance and user control - That's NOT always an easy thing!

Forgiveness

- Errors should be corrected quickly and easily
- If possible an “Undo” or “Revert” chance
- Easy “back to a specific point”-navigation if the user gets lost



From the Android Design Guidelines

Standard Android App-Interface:

1. Main Action Bar
2. View Control
3. Content Area
4. Split Action Bar

Design Patterns

- A design pattern describes a general solution to a recurring problem
- Patterns are created as a almost natural by-product of a design process - if you pay sufficient attention!
- Design patterns provide a good starting point for certain parts of an application

Each pattern includes:

- Title for identification (name)
- Problem matching (use if ...)
- Solution (use how ...)
- Rational (why is this a pattern which makes sense in many situations?)
- Clear examples which demonstrate the applicability

Design Pattern: Example (1/2)

Title:

- Dialog for loading bar (notification)

Problem:

- “How long does it take to load/download?”

Solution:

- Loading bar dialog creates a display-activity that takes the focus from the current application and outputs a message that shows the loading bar that indicates the loading progress in percentage
- The dialog closes automatically when the event is complete or the user has selected the option “Cancel” (button or “X”)

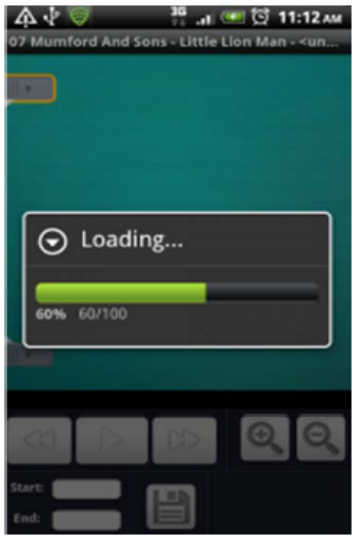
Design Pattern: Example (2/2)

Rational :

- The user has a good feedback about the loading progress
- The user remains in control because he/she can interrupt the loading by choosing “Cancel”

Restrictions:

- Takes focus away from the current application and forces the user to wait or cancel



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VERY LARGE BUSINESS APPLICATIONS