Mobile Applications and Services
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Generic UI/UX Design

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Mobile

1. Permanently carried
2. Always on
3. Built-in payment mechanism
4. At point of inspiration
5. Accurate audience
6. Captures social context
7. Augmented reality
8. Digital interface to reality
Mobile Design

- User
- User Device (UD)
- User interface (UI)
- User Experience (UX)
Facts about User, UD, UI, and UX

- Design is not just what it looks like and feel like. Design is how it works.

- Users’ expectations and common conventions are directly translated to Value and Trust.

- Desktop PC and Web have evolved around task-efficiency model while Smartphone and mobile Web are about providing personal context-aware content and smart behavior.
Content

- User Interface
- Establishing a Mobile Mindset
- Mobile Usage Pattern
- User Experience

Ref:
- Mobile First, by LuckW
- Mobile design and development, by fling
- Designing the Mobile User Experience, by B. Ballard
USER INTERFACE
User interface

- Give you access to computing capabilities by abstracting the machine

- Allow user interact with a machine
  - Input ➔ system ➔ output
  - Human-machine interface, human-computer-interface, man-machine interface

- Example
  - Push button
  - Punched card
  - Command line interface (CLI)
  - Graphical user interface (GUI)
    - Windows, navigation, click
User interface
Natural user interface (NUI)

- **Invisible UI** helping human to continuously **learn** complex interaction
- Intuitive UI usable without learning
- Applicable to wearable devices as well as smartphones/tablets
- **Example**
  - Control robots (Microsoft Kinect)
  - Communication for sign language
Natural user interface (NUI)
Usage Curves and user interface

Augmented NUI

Wearables

Smartphones & Tablets

Laptops

Desktops

Emergent

Growth

Mature

Declining

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Content first then navigation

- Lot's of time spent for navigation to get the content
  - Speed matters: how long does it take to see the content
  - Space matters: save screen by minimizing the tabs/menu & navigation bar

- The content itself could serve as the interface
  - Interact with guessable, physical, and realistic gestures
  - Make use of skills learned through a lifetime of living

- Content first then navigation instead of navigation-first, then content
Mobile First

- **Design for mobile first**
  - Growth: new opportunities
  - Constraint: focus
  - Capabilities: innovations

- **Constraints make you more focus**
  - Screen size
  - Performance
  - Context (Time and Place)
Screen Size
Screen Size

- Flickr’s mobile web experience takes 60 plus navigation options down to six

- How did they do it?

- Put the focus on these key actions
  - Most Flickr users like to check in
  - See what’s happening with their photos
  - See new photos from people they know
  - Explore interesting images across the site

- Lesson learnt:
  - Know your audience
  - Prioritize what really matters for them
Performance

- Connection are not always fast
  - Manage size and number of files

- Reduce request and file size
  - Put collection of images into a single image (image sprites)
  - Bundle together and minimize CSS and Javascript files
  - Limit or remove dependencies on heavy Javascript libs

- Take advantage of new technologies
  - Proper HTTP headers
  - HTML5 and CSS3 capabilities
  - Application cache for local content storage (offline)

- Design choices impact application performance
Performance

- Speed is not just important on mobile
  - Amazon, Yahoo!, Microsoft, and others has consistently shown that even very small delays (100ms) on the desktop can turn users away

- Example:
  - Amazon: 100 ms delay results in 1% sales loss
  - Yahoo: 400ms delay result in 4-5% drop in page traffic
  - Google: 500ms delay drop search traffic by 20%
  - Bing: 1s delay result in 4% drop in revenue
Context

- Time and place play an important role in how mobile phones are used.
- **Design for anywhere and anytime (mostly for killing the time)**
  - 84% use them at home
  - 80% use them during miscellaneous downtime
  - 74% use them while waiting
  - 69% use them while shopping
  - 64% use them at work
  - 62% use them while watching
  - 47% use them during their travel
  - ...
- **It is unlikely to get someone’s full attention**
  - Partial attention or a short burst
  - Even in distraction-free environments where focus is possible, a simplified mobile experience making people feel comfortable and relaxed.

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Capabilities

- Location detection: GPS, WiFi, cell towers
- Orientation: direction from a digital compass
- Device positioning & motion: from an accelerometer
- Audio: input from a microphone; output to speaker
- Video & image: capture/input from a camera (dual and back)
- Device connections: through Bluetooth between devices
- Proximity: device closeness to physical objects
- Ambient Light: light/dark environment awareness
- RFID/NFC reader: identify & track objects with broadcasted identifiers
- Multi-touch sensors
- Haptic feedback: “feel” different surfaces on a screen
- Biometrics: retinal, fingerprint, etc.
- Push: real-time notifications “instant” to user
Capabilities

- Navigate the space around you
- Augment your immediate surroundings
- Interact with nearby objects, locations, or people
What is and Why a **smart** mobile app?

What are the ingredients for a **smart** app?
Smart app ingredients

- Awareness of user environment by adding relevant information on the present as a function of user preferences/profile
  - User becomes part of the experience
  - User experiences a better decision-making

- My environment (physical location/social context) may influence my actions

- Context is what make mobile device a powerful medium
Smart app ingredients

Smart App

- Rules
- Context
- Content
Rules

- **Local view**
  - Event sources
  - Event filter
  - Event processing
  - Event

- **Network view**
  - Asynchronous notify & C/S approach
  - Pub sub model
  - Complex network
ESTABLISHING A MOBILE MINDSET
Establishing a Mobile Mindset

- Small Screen
- Handed Operation
- Battery-Powered
- Inconsistent Connectivity
- Always On, Always Connected
- Text Entry
- Consistent User Interface Style
- Changing User Context

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Usage Pattern

- Personal handheld device
- Identifiable and locatable
- Wakable by user or network
- Always on your pocket, always on, always connected
- Minimal interaction in the order of few seconds
- Minimal attention
- Hand-free interaction in any situation and position
- Changing user context
- May modify the social experience both positively and negatively
Establishing a Mobile Mindset

- It is often not possible to reuse ideas directly from the desktop UI world.

- Inventing intuitive and logic mental models is one of the base challenges in user interface design:
  - Access has to be simple with clear paths for common tasks.
  - Content must be categorized and ordered in some efficient manner.
  - Relevant features have to be selected and prioritized.
  - Feature prioritization requires a very good user understanding.
Establish a Mobile Mindset

- Achieve a great performance through appropriate design
- New interaction paradigm (usage pattern in order of few seconds)
  - Quick use, quick storage
  - Present useful information quickly
- Keep it simple, clear, and precise
  - Uncluttered, well organized user interface
  - Address a specific need
  - Most of built-in apps do only one thing
- One at a time please
  - no background applications
  - Your application quits when the home button is pushed
  - If your application opens another application
MOBILE USAGE PATTERN
Mobile Usage Pattern

- Interaction Type
- Action
- Input
- Visual design
- Information Architecture
Interaction Type

- **Lookup/Find**: urgent local info
- **Explore/Play**: local actions to pass time
- **Check In/Status**: repeatable important micro-tasking
- **Edit/Create**: one-shot urgent micro-tasking

- **New interaction paradigm (usage pattern in order of few seconds)**
  - Quick use, quick storage
  - Present useful information quickly
As a general rule, content takes precedence over navigation on mobile

- immediate access to content and not the site map
- adjust the structure accordingly to the app usage/audience
Action

- Tap
  * Briefly touch surface with fingertip

- Double tap
  * Rapidly touch surface twice with fingertip

- Drag
  * Move fingertip over surface without losing contact

- Flick
  * Quickly brush surface with fingertip

- Pinch
  * Touch surface with two fingers and bring them closer together

- Spread
  * Touch surface with two fingers and move them apart

- Press
  * Touch surface for extended period of time

- Press and tap
  * Press surface with one finger and briefly touch surface with second finger

- Press and drag
  * Press surface with one finger and move second finger over surface without losing contact

- Rotate
  * Touch surface with two fingers and move them in a clockwise or counterclockwise direction
### Example

#### Basic Actions

<table>
<thead>
<tr>
<th>User Action</th>
<th>Gesture</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change mode</td>
<td>press</td>
<td>Touch surface for extended period of time</td>
</tr>
</tbody>
</table>

#### Object-Related Actions

<table>
<thead>
<tr>
<th>User Action</th>
<th>Gesture</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delete</td>
<td>drag</td>
<td>Move fingertip over surface without losing contact (across item or off-screen)</td>
</tr>
<tr>
<td>Duplicate</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Navigating Actions

<table>
<thead>
<tr>
<th>User Action</th>
<th>Gesture</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scroll</td>
<td>drag</td>
<td>Move fingertip over scrollbar without losing contact</td>
</tr>
<tr>
<td>Scroll (fast)</td>
<td>flick</td>
<td>Quickly brush surface with fingertip in the direction you want to scroll</td>
</tr>
</tbody>
</table>
Input

- Text input has to be minimized
  - Search for innovative techniques for selection and language input.
- Designing interfaces that require less attention in dynamic environments
- Hardware buttons have some significant advantages on software (touch screen) buttons when it comes to eyes-free interaction
- Place interactive elements at bottom of screen
- Users should get enough feedback from the device
  - adapted to the user’s circumstances, e.g. no visual messages when a user is driving a car
  - immediate warning and fallback when Wi-Fi-connection or GPS is down
Input

- Good defaults
  - current date, time

- Auto-capitalize, auto-completion, and predictive text entry
  - Turn this off on email, password, URL

- Use information from other sources
  - desktop computer, laptop

- Alternate input methods
  - bar codes, QR codes, camera images, speech

- Gesture-based text entry methods
  - ShapeWriter or Swype

- Shake-based text entry
Visual Design

- Requires **creativity** and is a direct representation of everything underneath
  - Produce a relationship with users beyond any specific culture

- Good design matters
  - Users look at multiple screenshots
  - Users read the reviews, check stars and download rate
  - Users judge the app based on the quality of its icon
Visual Design Elements

- Messaging and branding
- Look and feel
- Layout
- Color
- Typography
- Graphics
A Quick Comparison

- Minimalist design vs heavy design
- Content-oriented vs. immersive
Visual Design Guidelines

- Use visual design to deliver your message and use branding to reinforce the message
- Use context and user preferences to adapt look and feel and evoke user actions
- Start building layout early (Different layout for different devices)
- Know your screen before dealing with the colors and font type
  - Color bit depth (12-bit, 16-bit, 18-bit, 24-bit)
  - Subpixel (RGB) and pixel density (PPI)
- Know the physiology and culture of colors
- Appropriate font type and size improve the readability
  - Contrast adapted to user environment
  - Line spacing (screen size determines how far the device is held from the eye)
  - Leave some space, don’t crowd the screen
  - Use headings and short paragraphs
- Use graphics to establish a visual experience
  - As complementary to look and feel
  - As content displayed with text
  - Size plays an important role in the recognition of images
Information Architecture

- How the information/content is structured and shaped and how users interact with it through different devices
  - Combining organization, labeling/tagging, searching, and navigation system
  - Supporting usability and findability

- How intuitive is to find information and perform tasks
How to interpret the content to the mobile context?
How to address non-French reader?
How to prioritize? How to navigate? What about the user interactions?
If I am not in NY, should I see the local headlines or instead the headlines based on my location?
Information Architecture: Usability?

- **Ease of learning**
  - Faster the second time and so on...

- **Recall**
  - Remember how from one session to the next

- **Productivity**
  - Perform tasks quickly and efficiently

- **Minimal error rates**
  - If they occur, good feedback so user can recover

- **High user satisfaction**
  - Confident of success
Information Architecture: Findability

- Ease with which information can be found
  - UI design
  - Accessibility
  - Search engine

- Evaluated through: tree testing and usability testing
Information Architecture: Guidelines

- Simple IA with clear and simple labels
  - What things are called (taxonomy)

- Clear Organization
  - Limited/no opportunities to mistake
  - Confirm the path

- Clickstream
  - Identify the shortcuts
    - by mapping the paths the user will take to perform the common task
  - Identify the flaws
    - by observing the order in which users may travel through your IA

- Wireframes
  - Layout information
  - Behavior
  - Flow

- Prototype ...
Reading lists 1: Platform-independent

- Tap worthy: Designing Great iPhone Apps, by J. Clark
- Designing the iPhone User Experience: A User-Centered Approach to Sketching and Prototyping iPhone Apps, by S. Ginsburg
- Designing the Mobile User Experience, by B. Ballard
- Mobile Interaction Design, by G. Marsden
- Strategic Mobile Design: Creating Engaging Experiences, by J. Cartman and R. Ting
- iPhone User Interface Design Projects, by K. Peters,
- Designing for Small Screens (Required Reading Range)
- Search User Interfaces, Marti A. Hearst, http://www.searchuserinterfaces.com/
Reading list 2: Platform Specific

- iPhone Human Interface Guidelines – PDF version
- iPad Human Interface Guidelines – PDF version
- UI Guidelines for BlackBerry 6.0 Smartphones – PDF version
- UI Guidelines for BlackBerry 4.x, 5.x Smartphones – PDF version
- Android User Interface Guidelines
- BlackBerry Browser Content Design Guidelines (PDF)
- Motorola’s Best Practices for Android UI
- Nokia Design & User Experience Library
- Symbian UI Style Guidelines (PDF)
- Forum Nokia Design Portal (PDF)
- Symbian UI Wiki
- Bada Application UI Guide
- Sony Ericsson UI Rulebook
- UI Guidelines for Windows Mobile
- Windows Touch UI Guideline
- UI Design & Interaction Guide for Windows Phone 7 (PDF)
- webOS UI Guidelines
- Hildon UI Guidelines for Nokia Maemo
- MeeGo UI Design Guidelines (shared by Mark Jones)
Information Architecture

Web as software interface

Visual Design: graphic treatment of interface elements (the "look" in "look-and-feel")

Interface Design: as in traditional HCI: design of interface elements to facilitate user interaction with functionality

Information Design: in the Tuftean sense: designing the presentation of information to facilitate understanding

Interaction Design: development of application flows to facilitate user tasks, defining how the user interacts with site functionality

Functional Specifications: "feature set": detailed descriptions of functionality the site must include in order to meet user needs

User Needs: externally derived goals for the site; identified through user research, ethno/techno/psychographics, etc.

Site Objectives: business, creative, or other internally derived goals for the site

Web as hypertext system

Visual Design: visual treatment of text, graphic page elements and navigational components

Navigation Design: design of interface elements to facilitate the user's movement through the information architecture

Information Design: in the Tuftean sense: designing the presentation of information to facilitate understanding

Information Architecture: structural design of the information space to facilitate intuitive access to content

Content Requirements: definition of content elements required in the site in order to meet user needs

User Needs: externally derived goals for the site; identified through user research, ethno/techno/psychographics, etc.

Site Objectives: business, creative, or other internally derived goals for the site

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