Building User-Centered Mobile Applications

Mgr. Rastislav Mirek

CEO, TypeSoft

Consultant, Touch4IT

PV239 Mobile Application Development, Faculty of Informatics, Masaryk University
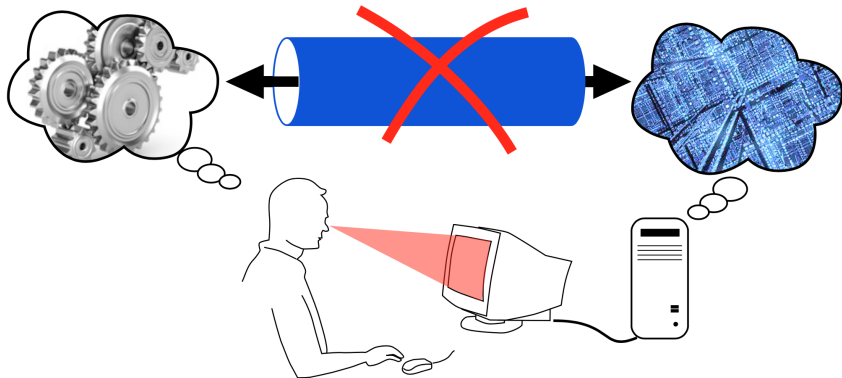
Organization

- Feel free to ask questions at any time.
- Breaks?
- Have something to add? Feel free to discuss.
- The lecture will be interactive - 14 discussion topics are prepared.

Outline

The Problem

It is incompatible interface problem: Computers do not "think" like humans.

Definitions

- Human-Computer Interaction (HCI)
  - Scientific field at intersection of Computer Science, Cognitive Science, Psychology and more.
  - Focused on interfaces between people and computers.
- User experience (UX)
  - Individual's emotions and attitudes about using a particular product, system or service.
  - Practical application of HCI.
- Usability = Ease of use and learnability of a human-made object, tool or device.

Discussion 1

Why is focus on UX in IT increasing? What is the key reason?

Increasing Importance of UX
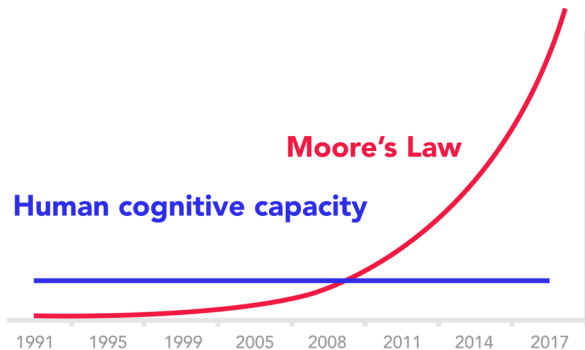
Increasing Importance of UX

- Processor time has become cheaper than human time.
  $\rightarrow$ Optimizing for people, not computers
- Cheaper computers mean a much wider audience.
- Today, it is easier to adapt computers to people than vice versa.

Discussion 2

What technologies might be used in the future to take mobile UX to the next level? How?

State of the Art and Future HCI Technologies

- Voice recognition, intelligent assistants
- Artificial Intelligence, Machine Learning
- Augmented reality? 3D displays? Virtual reality?

Developers And User Experience?

- Traditional responsibility of designer or dedicated UX designer.
- Developer often does not know user's needs because these are not communicated.
- *Developer knows UI capabilities and platform constraints.*

- Some designers are used to thinking about static screens. Developer must consider interactions, transitions, animations etc.
- *Increasing UX requirements for mobile developers.*

Discussion 3

What are the key qualities of a good/usable user interface?

The Goal

Interactive systems that are well suited to needs of the users –

- not to needs of the boss
- not to needs of the developer - *"I can easily add animation here"*
- not to wishes of the user - *"It would be great to have an email client in my browser"*

Users' Needs: Defined & Measurable

1. Allow users to do what they need to do. Aim accurately.
2. Learning curve.
3. Users' efficiency: Time to do a particular task.
4. Number of errors made. How critical are the consequences?

# Making It Simple Is Difficult
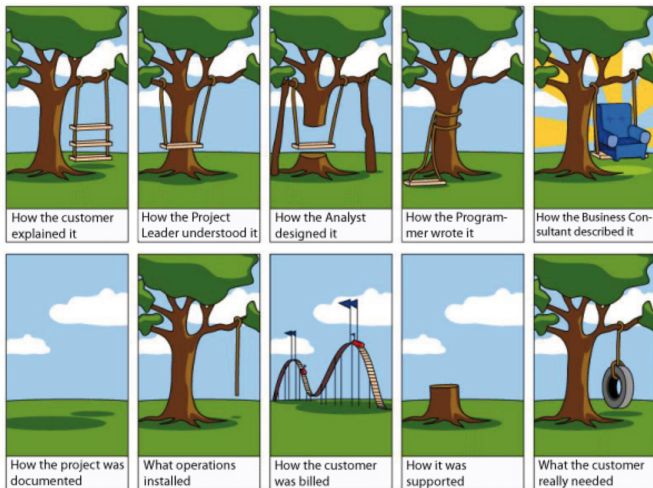
UX Design Method in Short

Key Steps

1. Observe, study users needs, existing/legacy systems, understand, specify
2. Analyze, brainstorm, create
3. Prototype
4. Evaluate, test - *with users*
5. Iterate, repeat 1-5

- Key principle: Stay user-centered.
- Guessing can lead to bad results. Focus on steps 1 and 4 whenever possible!
- Many techniques for each step.

UX Design Method in Short

- Know your audience $\rightarrow$ personas
- Priority tasks *for your users* (quantify frequency) $\rightarrow$ use cases (task-centered design)
- Find out context of your users (knowledge, environment, situation, ...)

Prototyping   Evaluating
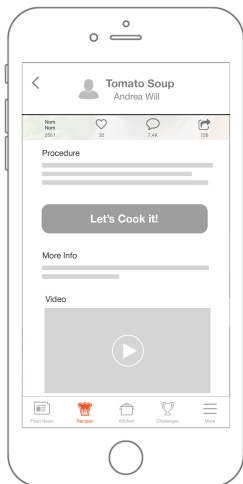
Thanks to Let's Cook for permission to use the example.

Discussion 4

Why does scrolling feel intuitive on mobile devices?

Principles to Keep in Mind in Creative Phases

- Associations, familiar experiences, metaphors
  - from the real world
  - from the digital/virtual world
- Internal integrity of the system
- Consistency with platform
- Providing feedback for actions
- Similarity to existing system known to users
  - Legacy systems, real world processes, pen & paper

How to think about UX

- Critically, analytically, creatively
- *You are not your user*
  - Users do not know what you know
- UX is everywhere – not only on the screen
  - You can observe, be critical and learn almost anywhere
- Question the common, typical solution
- Experiment, evaluate assumptions

Discussion 5

Is there something wrong about folder-based (hierarchical) file systems from the UX perspective?

Discussion 6

What is human "clock rate" (perception speed) ?

How Humans Perceive, Learn and React

- Fastman can perceive an event of 50 ms duration, react in 30 ms
- Short-term memory capacity is 7 ± 2 "chunks"
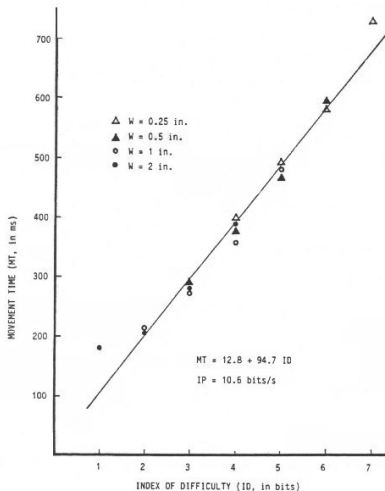- Cognitive models: Theory of Action, Rasmussen's model, The Model Human Processor, Fitts' Law, ...

Reasoning

reflexes

Fitt's Law Experiment
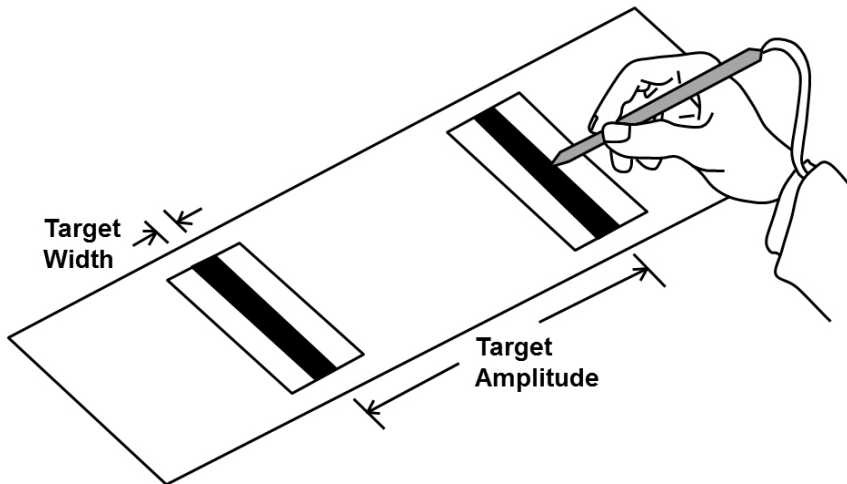
MacKenzie, I. S. (1992). Fitts' law as a research and design tool in human-computer interaction. *Human-Computer Interaction, 7, 91-139.*

Fitt's Law

MacKenzie, I. S. (1992). Fitts' law as a research and design tool in human-computer interaction. *Human-Computer Interaction, 7, 91-139.*

Related Course at FI MU

Interested? There is much more to learn and try out.

PV182 Human Computer Interaction

Discussion 7

What are the key differences between desktop and mobile UX?

Mobile vs. Desktop UX

- Touch screen
  - Control/input elements change dynamically
  - Gestures are easiest with touch screen
- Small screen $\rightarrow$ Challenging
- Usage patterns: It's mobile
  - fast tasks
  - on the go, different environments, conditions
  - new types of tasks
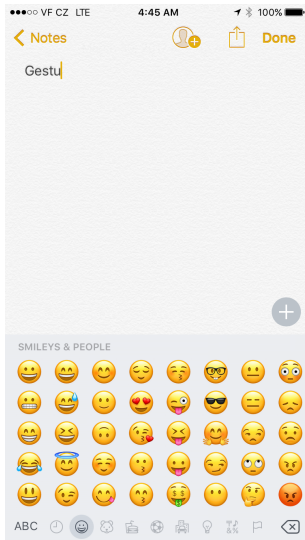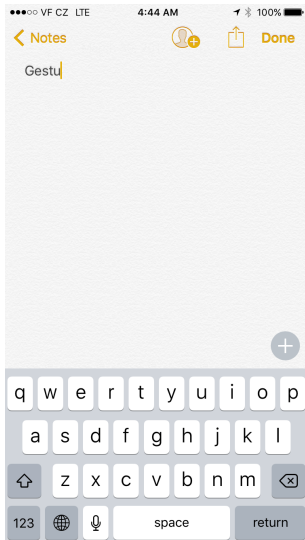- Specific device capabilities

Discussion 8

What are the pros and cons of a scrolling mobile keyboard to switch character sets? Please compare with traditional switch button.

Scrollable Keyboard - Example of Using Gestures
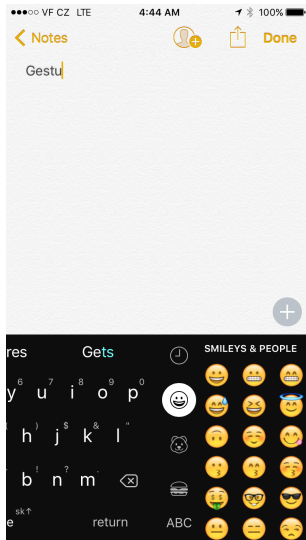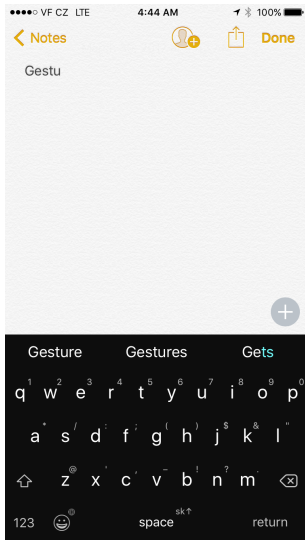
Comparison with Standard Keyboard

Discussion 9

What is the key difference between mobile platforms (iOS, Android, WP) in terms of UX?

Mobile Interface Guidelines

- iOS Human Interface Guidelines
- Android: Material Design (Patterns, Motion, Layout, ...)
- Windows Phone?

Want to be a great mobile developer? Read it.

Mobile Interface Guidelines - Examples

- General principles
  - Balance between enabling users and avoiding unwanted outcomes
  - Fast apps, immediate feedback
  - Sense of depth, layers
- More specific
  - Types of navigation
  - Delay sign-in
  - Suppress settings and file system (replace by lists/tables)
- Very specific
  - Minimum button area
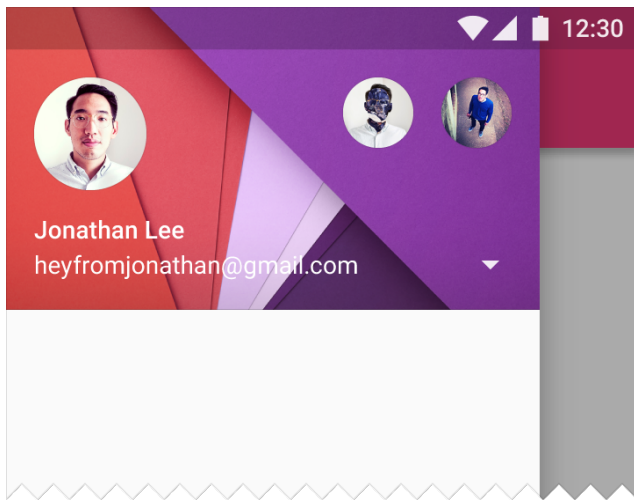 - How to format dates
  - How to use components

Discussion 10

What is the difference between the Back and Up navigation buttons on Android? Is there a UX issue related to this?
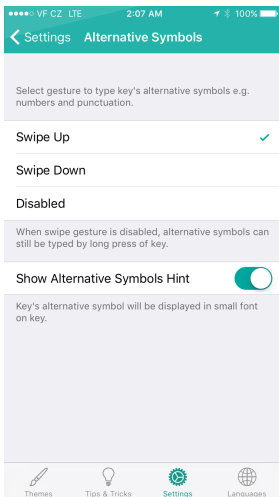
Android Up and Back Navigation

Types of Navigation

Hierarchical

Flat

Content-driven or Experience-driven
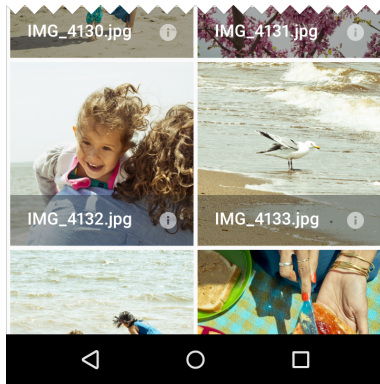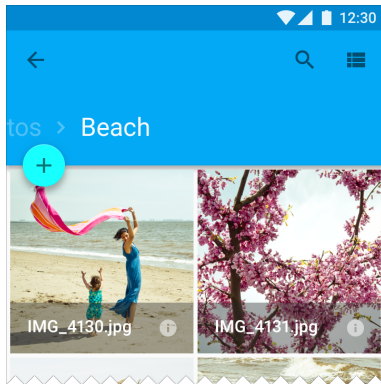
Navigation Drawer

Combining Navigation Types

Navigation

- Notion of location
- To use or not to use Hamburger?
  - "Hamburger" = side menu :)
 - Breaks notion of location - where is the active screen located?

Animation and Motion

- In the real world there are no immediate transitions
- Natural feeling is important
  - Elements should have momentum, accelerate and decelerate, respond to gravity, interact, ...
- Duration: Fixed duration vs. fixed speed
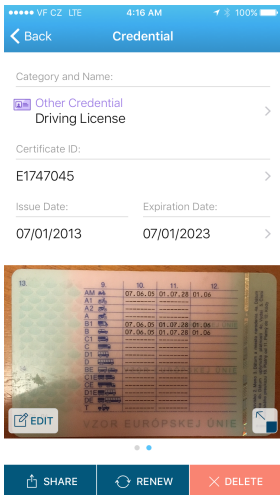- Motion provides meaning: hints function, gives feedback, focus, notion of location

Discussion 11

What could be problematic about the icons on the
following slide, considering a global audience?

Using Icons
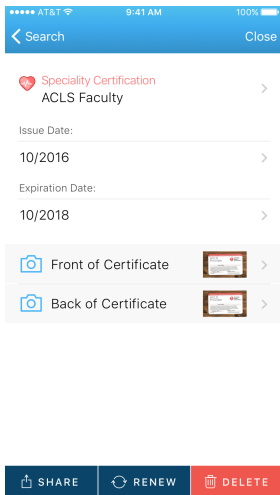
Thanks to Mile One LLC for permission to use the example (working version).

People Perceive Icons Much Faster Than Text

Thanks to Mile One LLC for permission to use the example (production version).

Common Problems

- Trying to squeeze too much on one screen $\rightarrow$ modality, focus
- Error handling
- More diffucult than normal data entry - often makes a big difference in UX
  - Guess input values
  - Shortcuts (e.g. emoji)
  - Use correct type of keyboard
- Accessibility
- Keep it simple: e.g. consider sending message via Facebook rather than implementing in-app chat
- Displaying complex data - tables and lists

Handling Errors - Example

Discussion 12

How would you design a mobile calculator for the visually impaired?

Specific Interactions Enabled by Device Capabilities

- 3D touch
- Fingerprint sensor
- Voice control
- Haptic feedback (be careful about overuse)

Discussion 13

Is there a usability issue with the iPhone home button?

Some Advices

- Localize
- Please, no Save buttons
    - Consider undo and redo operations
- *Study guidelines* and follow them
- Prefer native components
- Inform users about latency $\rightarrow$ activity indicators
- Some useful tools: UsabilityHub, Invision, Moquaps, ...

Discussion 14

How could your programming UX be improved?

Many Thanks to...

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Questions?

Thank you for your attention.