Basics of Interface Design

«UCD: User-Centered Software Development»

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Basics of Interface Design
Introduction

Context for today

Last week

Usability Inspection

» Action Analysis

» Heuristic Evaluation

» Cognitive Walkthrough

This week

Elaborate on questions you should ask when designing your application, esp. error handling, ui controls, responsive design

What makes a good design (for what device)?

Outline

1. Designing your application

2. Affordance

3. Modes of Interaction

4. Error Handling

5. Designing for Mobile Devices

6. Intuitiveness and Ease

Learning goals for today

» Know the questions you should ask when designing your application

» Know categories of UI controls

» Know how to write effective error messages

Interface Design
Designing your application

What questions should you ask?

1. **Affordance**: does the visual design provide sufficient cues?

2. **Intuitiveness**: Is the design intuitive – does the user expect it?

3. **Ease**: Is the interaction easy to perform?

4. **Integration**: Do all of the interactions used in the design work elegantly together?

5. **Controls**: Are UI controls appropriate?

6. **Feedback / Messages**: Are error messages, feedback, and instructions meaningful and useful?

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Affordance

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Affordance

Affordance are the "perceived and actual properties of an object, primarily those fundamental properties that determine just how the object could possibly be used"

Donald Norman

What does affordance mean in Interface Design?

Norman considers an affordance to be a relationship between an object and a user, not a property of an object

Affordance is when a control behaves as its appearance suggests. A command button, for example, is said to have good affordance when it looks clickable.

Underlying idea: It has to be clear what happens when taking an action on an object!

Affordance Confusion: when certain aspects of an object do not work in a way in which we assume they should

Interface Design
Modes of Interaction

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Modes of Interaction

Mouse interaction

» simple: e.g. click on a menu entry, link, or button

» complex: e.g. Drag and Drop

Keyboard interaction

» simple: e.g. Pressing a key (enter, spacebar), basic typing

» complex: e.g. 2 and 3 key combination sequences, alternate key)

Touch interaction

» multi touch interaction

Voice interaction

» speech recognition or typed natural language can be used

Gesture interaction

WIMP(Windows, Icons, Menus, Pointers) –

Default style for majority of interactive computer systems today.

Minimize the need to switch devices

» Designers should minimize the need to switch devices ("device jumping")

» Switching from the keyboard to the mouse "costs" 3-8 keystrokes: When using applications, proficient typists would rather type 3 -8 keystrokes than move from the keyboard to a mouse

» If your development environment allows, there are good keyboard equivalents for mouse selections on the web

» **Provide keyboard shortcuts whenever possible**

Devices and Peripherals –
Touch Interfaces

» Multi-select - May require lasso, special multi select mode, or checkboxes

» Not data entry friendly – Good for direct manipulation of interfaces rather than data entry and dragging objects

» Discoverability of gestures – Devices that require low learning curve (e.g. kiosk) gestures may need visual support.

» Feedback – Lack of real feedback in touch screen interactions must be reinforced with strong visual and audio feedback.

WIMP(<u>Windows</u>, Icons, Menus, Pointers)

Default style for majority of interactive computer systems today.

» Areas of the screen that behave as if they were independent terminals

» Can contain text or graphics and can be moved or resized

» Can overlap and obscure each other, or can be laid out next to one another (tiled)

» Scrollbars allow the user to move the contents of the window up and down or from side to side

» Title bars describe the name of the window
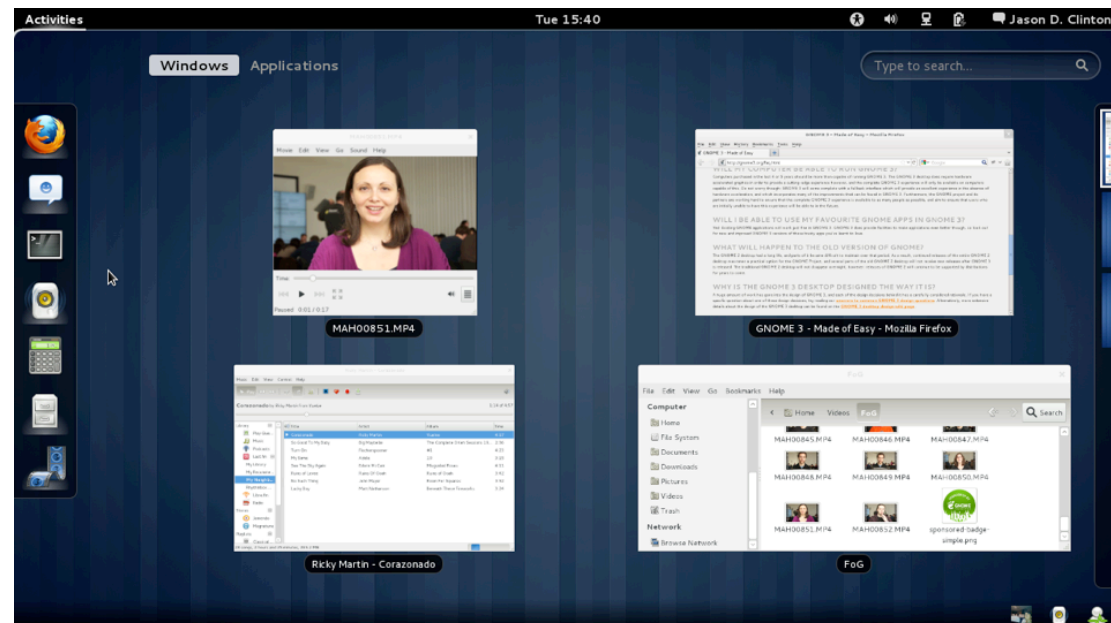
WIMP(<u>Windows</u>, Icons, Menus, Pointers)

Windows turn a physical display into several virtual displays.

» Optimise display space

» Interact with multiple sources

» Interact with multiple views

» Enable standardisation of interaction

What if we have many active windows?

» Either some obscured ⇒ hard to find or all visible ⇒ too small, much scrolling

» Solutions: folders, rooms, virtual screens, iconified windows . . .

An application might use multiple windows to organise separate but related information, e.g. multiple Single Document Interface vs Multiple Document Interface.

WIMP(<u>Windows</u>, Icons, Menus, Pointers)

A dialog box is a pop-up window

Modal dialog

» Stops user's work flow as main window is inaccessible
» Very annoying if it is either an informational-only message, or asking a question that the user cannot easily answer
» Useful in some cases; e.g. file save dialog
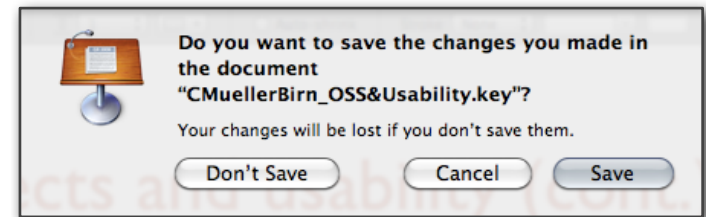
Modeless dialog

» Extra window co-exists with parent
» Can result in many windows – junk that must be later cleared
» Does not restrict work flow (unless it claims focus)
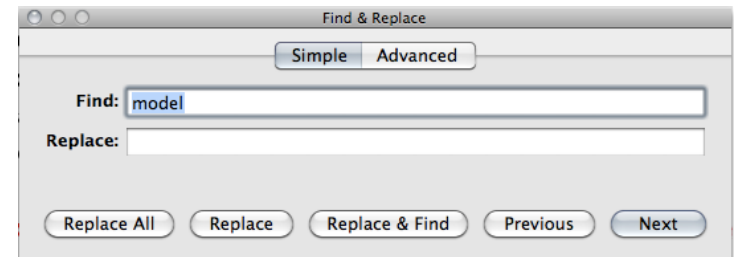
Use pop-up dialog boxes with care. Do you really need one? If possible, use an alternative, such as more intelligent coding or status information.

WIMP(Windows, Icons, Menus, <u>Pointers</u>)

Important component, since WIMP style relies on pointing and selecting things such as icons and menu items.

» Usually achieved with mouse

» Trackpad, cursor keys or keyboard shortcuts are also used

» Wide variety

Done   or Cancel

select favorite animal ▼
dogs
cats
goldfish
snakes
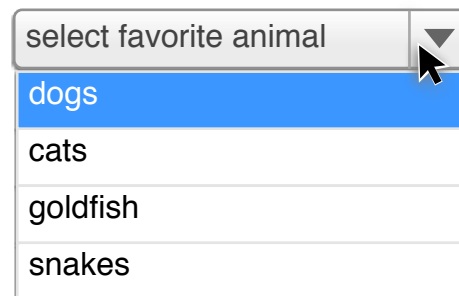
WIMP(Windows, <u>Icons</u>, Menus, Pointers)

Small picture or image, used to represent some object in the interface, often a window. Windows can be closed down to this small representation (iconised) allowing many windows to be accessible

Icons can be many and various - highly stylized or realistic representations

http://www.flaticon.com/
https://thenounproject.com/
https://www.iconfinder.com/
https://icons8.com/
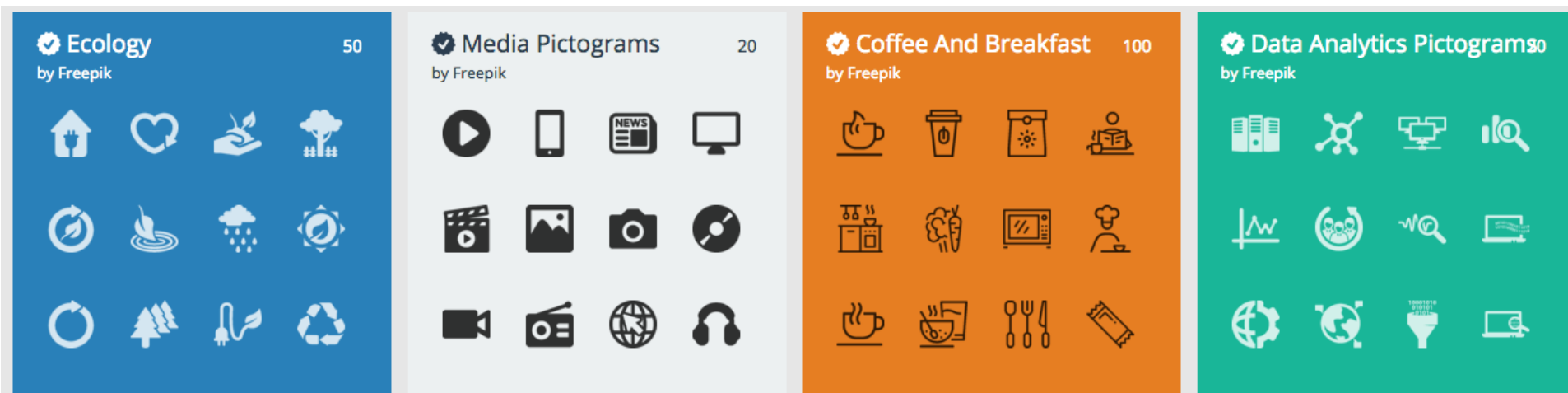
WIMP(Windows, Icons, <u>Menus</u>, Pointers)

Menus are based on recognition as opposed to recall

No need to remember commands

Users search from a list of possible choices

List provides constraints

Appropriate for small screens (iPod)

Menu-based interfaces and ...

» Articulatory Distance: Menu options create small articulatory distance

» Mental Models: Menu construction has a direct impact on user's mental model

» Affordances: Menu elements present affordances

WIMP(Windows, Icons, <u>Menus</u>, Pointers)

Most menus are a variation on a few basic categories (Navigation Models)
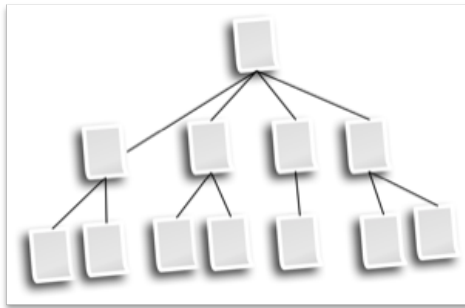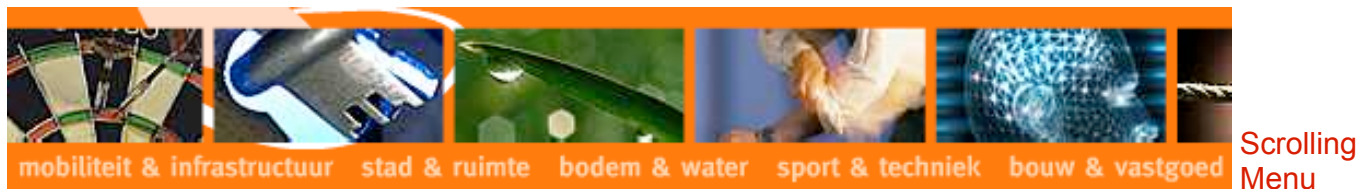
Hierarchical

Sequential
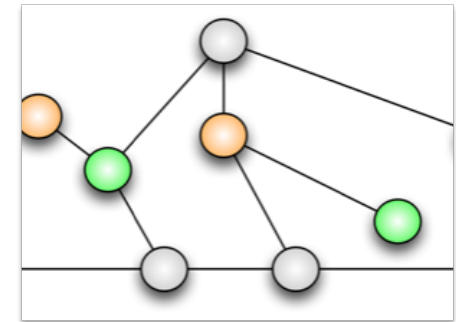
Organic
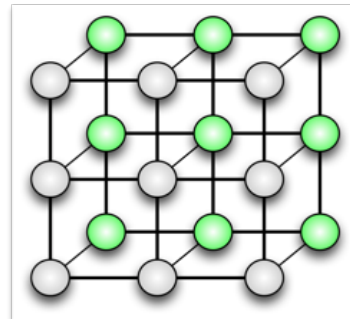
Matrix
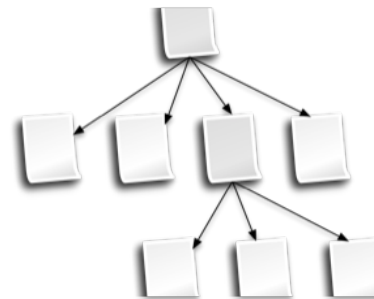
Hub and Spoke

WIMP(Windows, Icons, <u>Menus</u>, Pointers)

Types of menus

» Pull-down menus are dragged down from a single title at the top of the screen

» Pop-up menus appear when a particular region of the screen (maybe designated by an icon) is clicked on

» Pin-up menus stay on the screen until explicitly requested to go away

» Fall-down menu, similar to the pull-down, but the bar doesn't have to be explicitly selected

Scrolling Menu

Icon Menu

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Choosing an appropriate UI control

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UI Controls

Data entry controls

Action or Navigation controls

Selection controls

Combobox vs. Listbox vs. Dropdown-List

Listbox	**Dropdown**	**Combobox**

Selection
- Choose one value or more values from a list
- You can hold down the Control key while clicking Two important properties
- Need to show some items but not all
- When space is adequate

Selection
- You can select one value from a list
- When space is tight (avoid very long lists that require excess scrolling)

Data Entry + Selection
- Select from a list of many; user can either type a value directly or choose from list of existing options
- Have given options but maybe none applies; allow the user to type his choice in own words

Radio Button vs. Checkbox

Radio buttons
- Selection
- Set of mutually exclusive choices
- Select one from a short list.

Red
Green

Check boxes
- Selection
- Set of non-exclusive choices
- Select one or more from a short list.
- Making a binary choice

Accept terms of privacy
Subscribe to newsletter

Best practice rules:

» Do not use radio buttons or check boxes to launch actions. Use for selection only.

» Make a particular check box or radio button default if it's the choice selected 80% of the time

» Use radio buttons and check boxes to change the contents.

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Link vs. Button Guideline

This distinction is based on the evolving conventions of how controls are used on the Web. It is likely that the association of buttons with actions comes from their use in GUI applications.

Use a link to navigate. Buttons are for actions.

Interface Design
Error Handling

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Error Handling

What does the system do when people make mistakes, and what can the system do to prevent those mistakes from happening in the first place?

1. Make errors impossible!
2. Prevent errors
3. Detect errors
4. Handle errors
    i. Correction / Feedback
    ii. Recovery

Each layer of error handling in your interaction design ensures that a higher percentage of users will have positive experiences.

Source: „The elements of User Experience" by Jesse James Garret
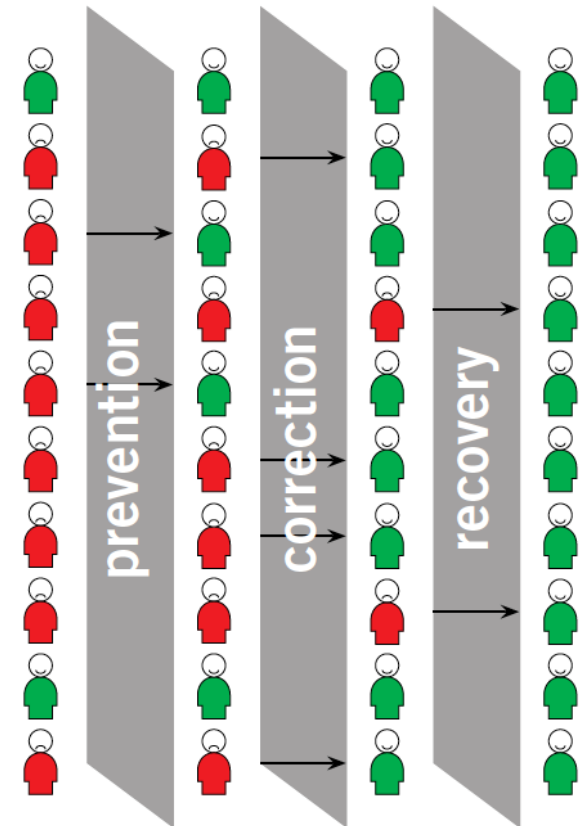
Error Prevention

» Disable non-applicable choices

» Use selection instead of data entry controls whenever possible

» Use aided data entry

» Provide default data whenever possible

» Provide previews of actions prior to completion

» Require confirmation of destructive permanent actions

If appropriate, provide <u>subtile</u> auditory feedback when errors are made.

Error Detection

Field-level detection

» Data are reviewed when entered

» Validate as close to the point of entry as possible.

> **! Invalid e-mail**
> please enter a valid e-mail address
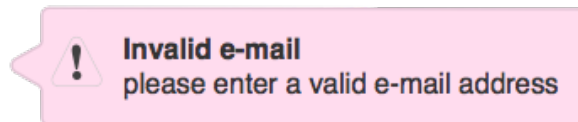
Use

» Error checks

» Warnings

» Consistency checks when entry is completed, then run the checks for "heads-down" entry below

Form-level detection

» Data are reviewed after user submits form

» Validate when the work is completed or the window is closed.

X Error

• **ZIP code: invalid input**

Your contact to company

* Required

Your Email *

test@example.com

ZIP code

4321A

U.S. ZIP code of form 12345 or 12345-1234

Embedded Error Messages

» Provide the error message on the same page so user's don't have to remember the message and go back to the form.

» Specific problem fields are more easily identified.

» Use color (red) to provide an additional visual cue.

Error Handling

Error Correction

» Automatic Correction - provide alternatives if you know the solution.

   » Just fix it (Example: spelling correction in word)

   » Inform user of fix!

» Ask for permission to fix it (Example: google search)

» Just give user an error message.

Feedback

» Well-written, helpful error messages are crucial to a quality user experience
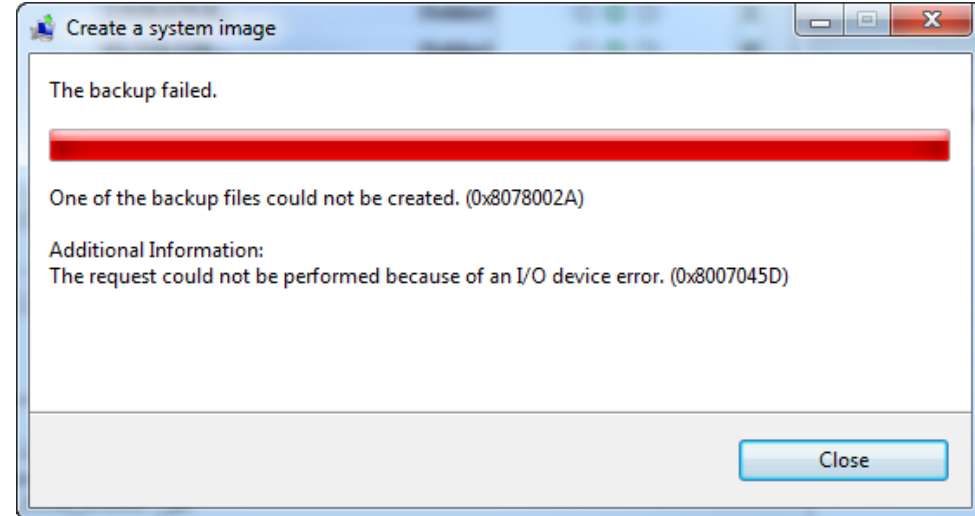
Effective Error Messages

Good error messages tell users

» What was entered

» What was wrong

» What to do

» The consequences of their actions

Make sure error messages are

» Precise and specific

» Written in familiar language

» Non-accusatory or alarming

Give Feedback – Managing User Wait Time

For response times of 2-4 seconds:

Show an animated hourglass / progress wheel

For response times of 4 -15 seconds:

Show a progress indicator

Mention to the user that it may take several seconds to get a response

Example: "It may take several seconds for each account to be retrieved."
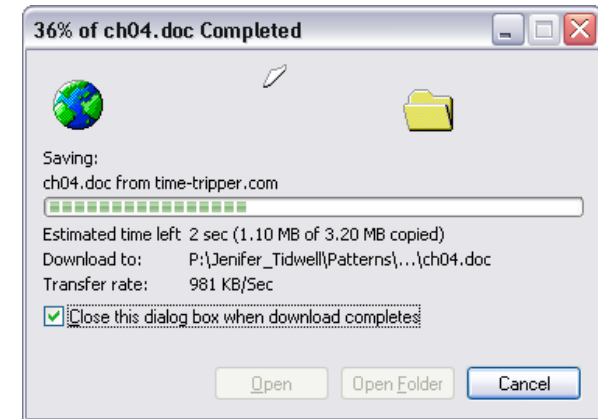
For response times longer than 15 seconds:

Show a "processing ..." or "in progress ..." indicator and/or

Consider adding a transient "processing" message (disappears after about 5 seconds); when done, display a notification icon or message

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Designing for mobile devices

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Why it is useful to talk about it?

Share of Mobile Media Users Across Markets

76.2% JAPAN
56.6% UK
56.2% U.S.
49.9% CANADA
49.7% SPAIN
43.9% FRANCE
43.6% ITALY
40.0% GERMANY
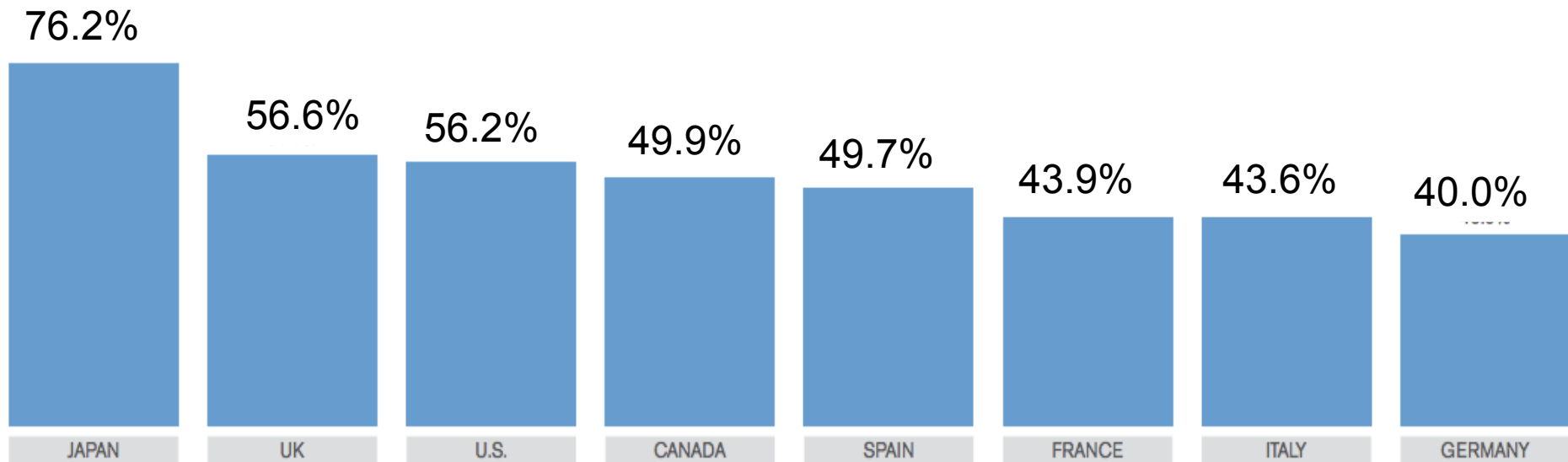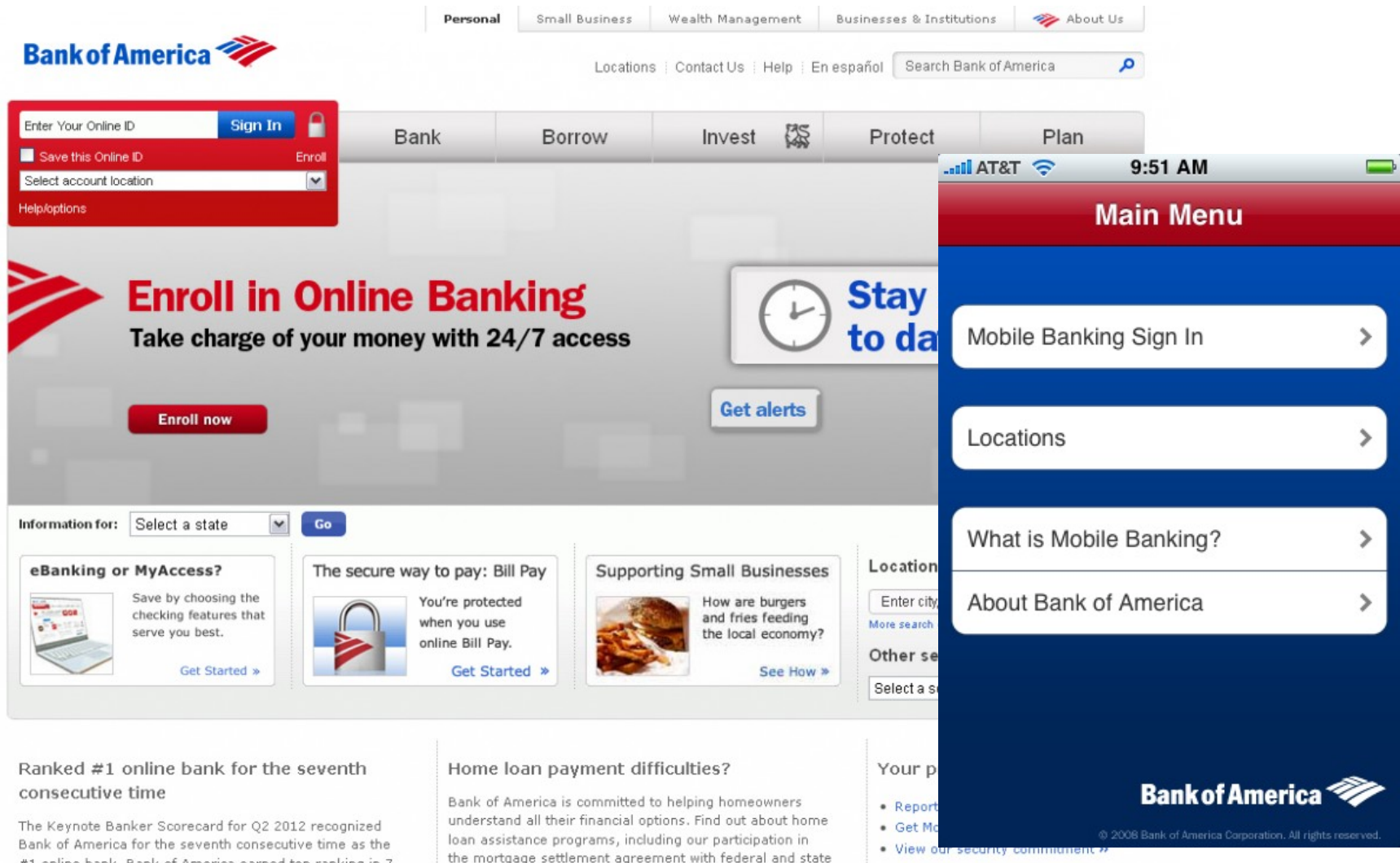
Source: comScore MobiLens, 3 mon. avg. ending Dec-2011

Why it is useful to talk about it? (*cont.*)

http://dev.headlondon.com/greenwich/design-principles
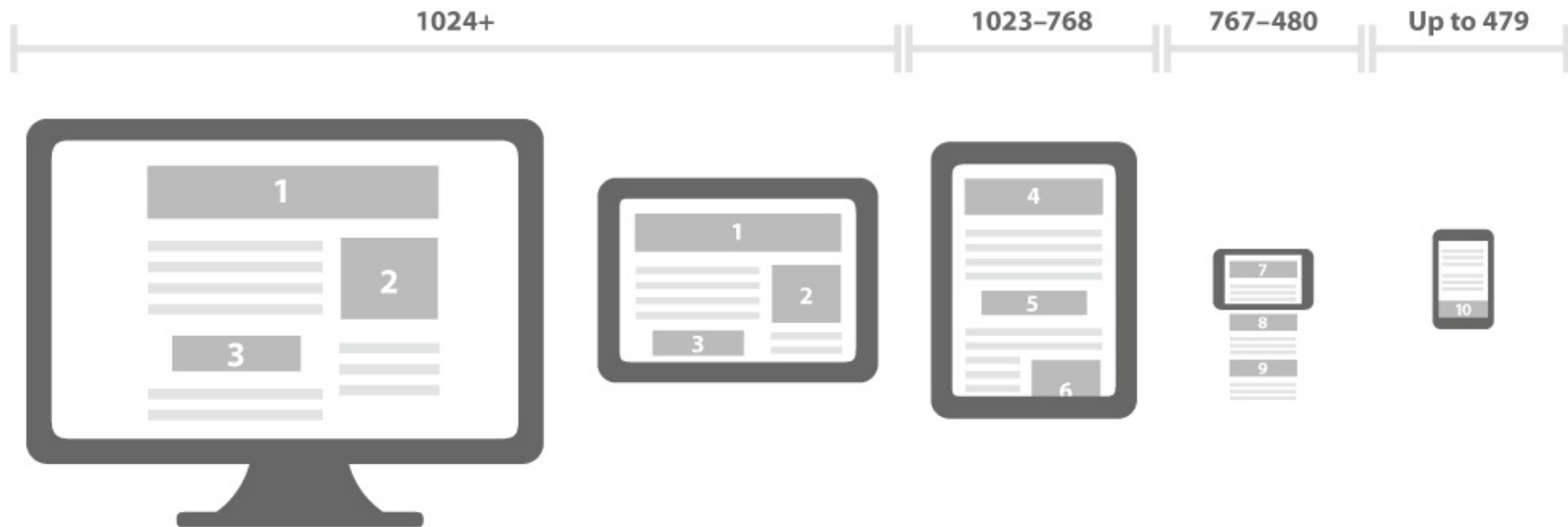
What are users' top tasks in each situation?

What is the best way to go?

	Mobile website	Mobile web app	Application
Platform independent	*Yes*	*Specific to HTML5 version*	*OS specific*
Maintenance and updating	*Developer*	*Developer*	*User*
Installation	*Unnecessary*	*Hard*	*Hard*
Content restrictions	*No*	*No*	*Yes*
Access GPS	*Possible*	*Possible*	*Yes*
Access Camera	*No*	*No*	*Yes*
Offline Functionality	*Limited*	*Limited*	*Yes*
Personalization	*Limited*	*Limited*	*Yes*

▇ strength

Raluca Budiu: Usability of Websites and Apps on Mobile Devices, Usability Week 2012

What is responsive design?

Dynamically changing the layout of a webpage depending on the screen size and screen orientation by using different style sheets for different screen dimensions.

http://www.dwuser.com/education/content/responsive-design-a-crash-course-and-demo/
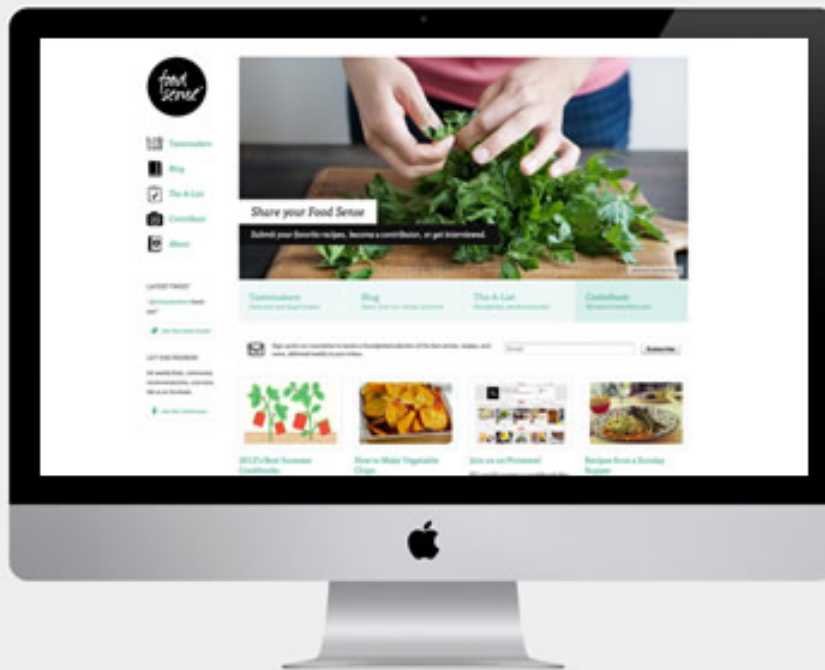
Selected principles of mobile design

Design for interruptions

» At any moment the user's task may get interrupted

» Task can be resumed on mobile or on desktop and offline

Consider the opportunity cost of each design element

» Central question you should ask yourself: "Include design element", OR "Leave out design element, but give up space"

» Exemplary option: "Don't include breadcrumbs" BUT "Users may get lost and take more steps to navigate"

Minimize Interaction Cost

» Interaction costs are the effort the user has to make in order to interact with your site or app (e.g., waiting, typing, scrolling, clicking)

Interface Design

Intuitiveness and Ease

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User Testing Paper Prototype

Testplan

	Team						
	1 *Buch*	2 *Comic*	3 *Regie*	4 *Kochen*	5 *Daten*	6 *LMS*	7 *Ein-kaufsliste*
Runde 1 16.00 bis 16.30	**Ben**	Ent-sendung **7**	**Alexa**	Ent-sendung **6**	**Monia**	Ent-sendung **1**	Ent-sendung **4**
Runde 2 16.30 bis 17.00	Ent-sendung **7**	**Monia**	Ent-sendung **2**	Ent-sendung **1**	Ent-sendung **4**	**Ben**	Ent-sendung **6**
Runde 3 17.00 bis 17.30	Ent-sendung **7**	Ent-sendung **4**	Ent-sendung **6**	**Ben**	Ent-sendung **2**	Ent-sendung **1**	**Monia**