

# Informatics 43

LECTURE 7-1

EMILY NAVARRO

# Last Time

- Design phase of software engineering
  - The “how” to the “what” of requirements
  - Architecture, functional decomposition, relational database design, OO design/UML, UI design, sketching
- Designs are used iteratively to think, talk, and prescribe
- Every design notation supports an abstraction
- A design diagram is a statement in a language that has a syntax
  - UML diagrams, UI mockups, pseudo code, ER diagrams, architecture diagrams, storyboards, sketches
- Software engineering is the process of building a set of related models that represent the system-to-be.

# Today's lecture

- Software Evolution (again)
- Why User-Orientation (Usability) Matters
- User-Oriented (User-Centered) Methods

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# Software Evolution (again)



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(If you explore just one

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These are the books we're featuring this month. Check them out every day so please come often. You never know what you'll find.

**ONE MILLION TITLES**

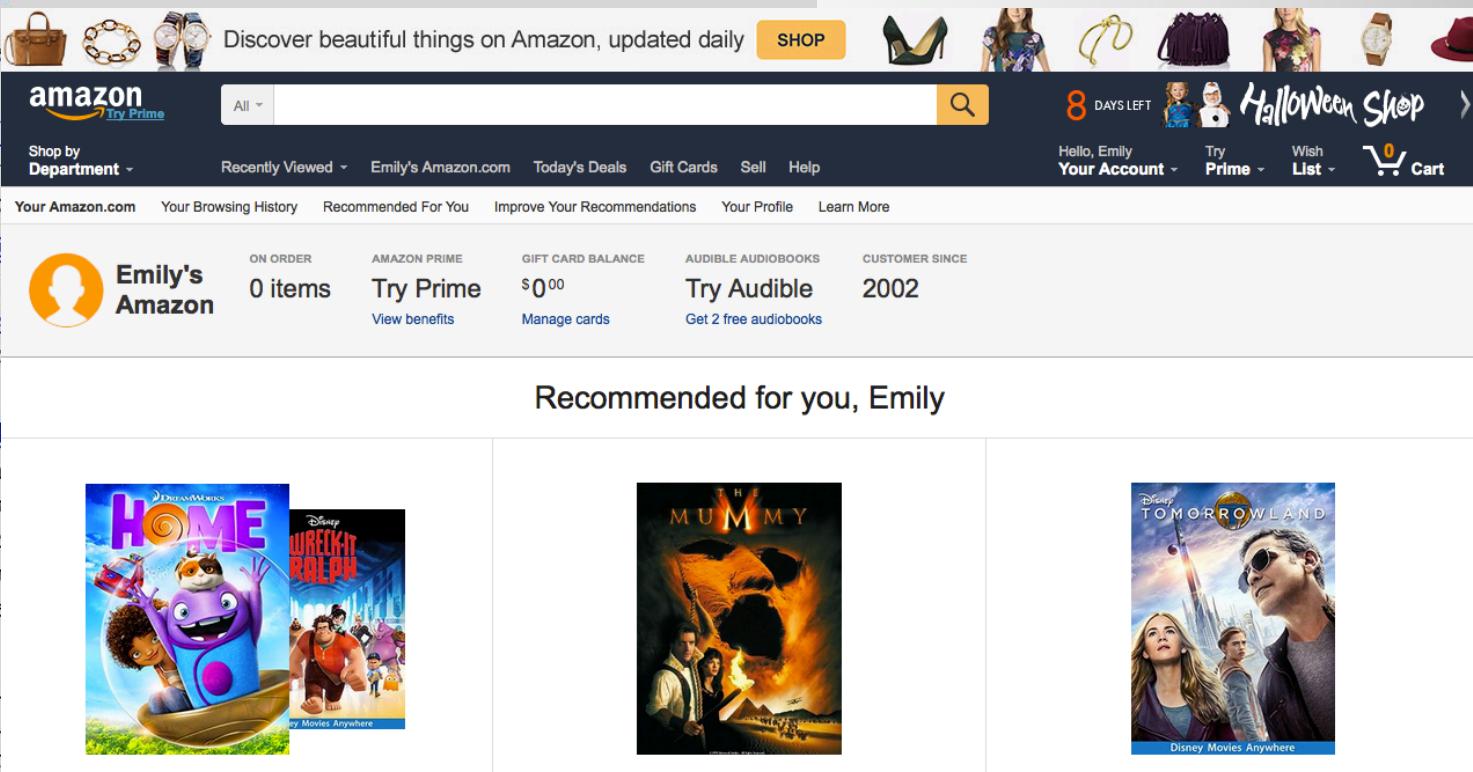
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CUSTOMER SINCE 2002

**Recommended for you, Emily**

# Software Evolution (again)

The screenshot shows the original Facebook interface from 2005. At the top, it says "[thefacebook]" with a blue header bar containing "home search global social net invite faq logout". Below the header is a large profile picture of Scott Pearson. The main content area is titled "Scott Pearson's Profile (This is you)". It features a "Picture" section with a photo of three men, an "Information" section showing account details (Name: Scott Pearson, BS; Member Since: January 12, 2005; Last Update: February 3, 2005), and a central news feed. The news feed includes posts from Erica Reiss, a photo of a person doing a handstand, and comments from users like Tom Booth and Monika Patel. On the left, there's a sidebar with links for "My Profile", "My Groups", "My Friends", etc. On the right, there are ads for Toyota and MetLife.

# Software Evolution (again)

2005



2007



2011

2012

A screenshot of the YouTube homepage from 2012. The layout is very similar to the 2007 version, with the 'Broadcast Yourself!' button and navigation tabs. The main content area shows a video thumbnail of a car and several other video thumbnails, including one from 'Consumer Reports' and one from 'Yogventures - Fire and Ice Update'.

A screenshot of the YouTube homepage from 2014. The interface has been updated again, with a more minimalist design. The 'Broadcast Yourself!' button is still present. Below it are tabs for 'Videos', 'Categories', 'Channels', and 'Community'. The main content area shows a video thumbnail of 'Nyan Cat [original]'. On the right side, there are sections for 'Suggestions' (listing 'Nyan Cat 2: Rainbow', 'Nyan Ho! Change (Nyan Cat)', and 'Nyan Ho! Change (Nyan Cat)') and 'Recommended Channels' (listing various channels like 'One Direction', 'PewDiePie', 'CandyCrush', 'Katy Perry', 'JAY-Z', 'VinegarGuru', 'YOASOBI', 'VinegarGuru', 'NBA', 'People &amp; Blogs', and 'Science &amp; Technology').

2014

# Software Evolution (again)

- Q: Why did Amazon/Facebook/YouTube/... change?
- A: It's all about the user!

# Today's lecture

- Software Evolution (again)
- Why User-Orientation (Usability) Matters
- User-Oriented (User-Centered) Methods

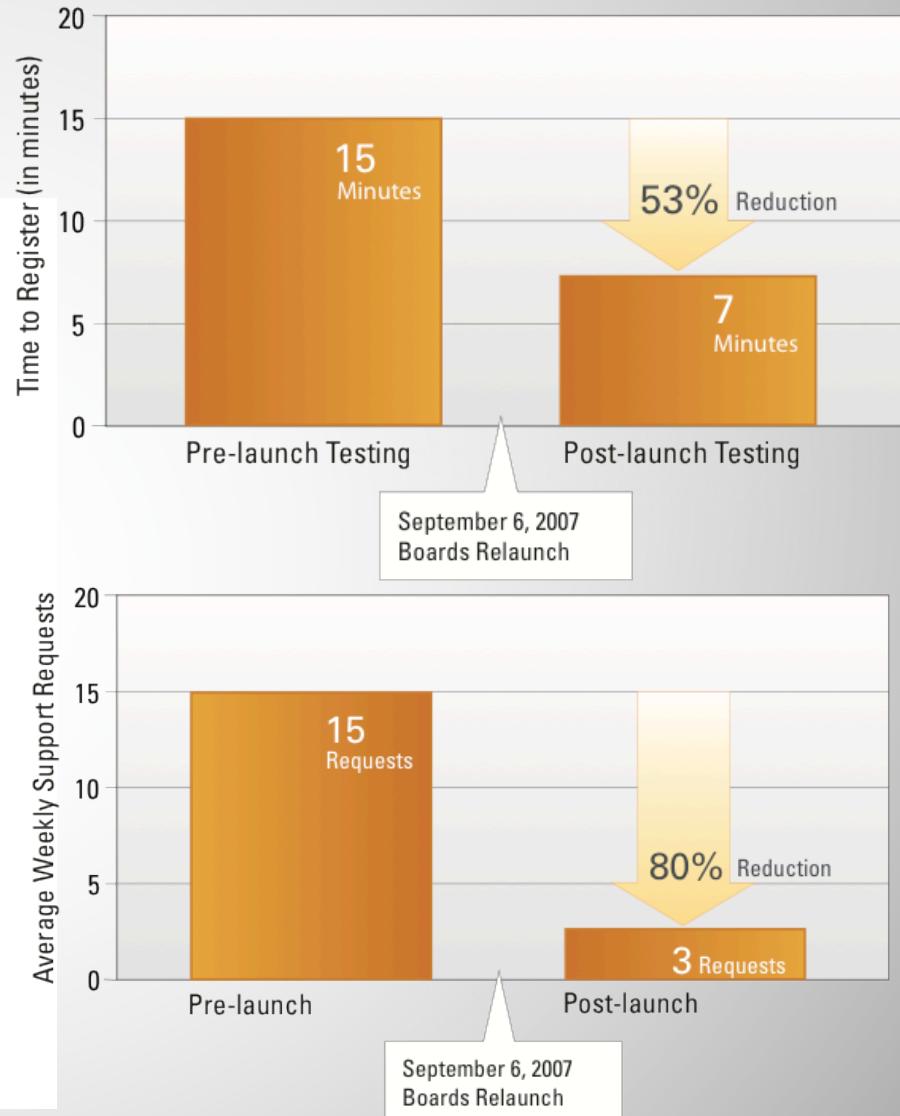
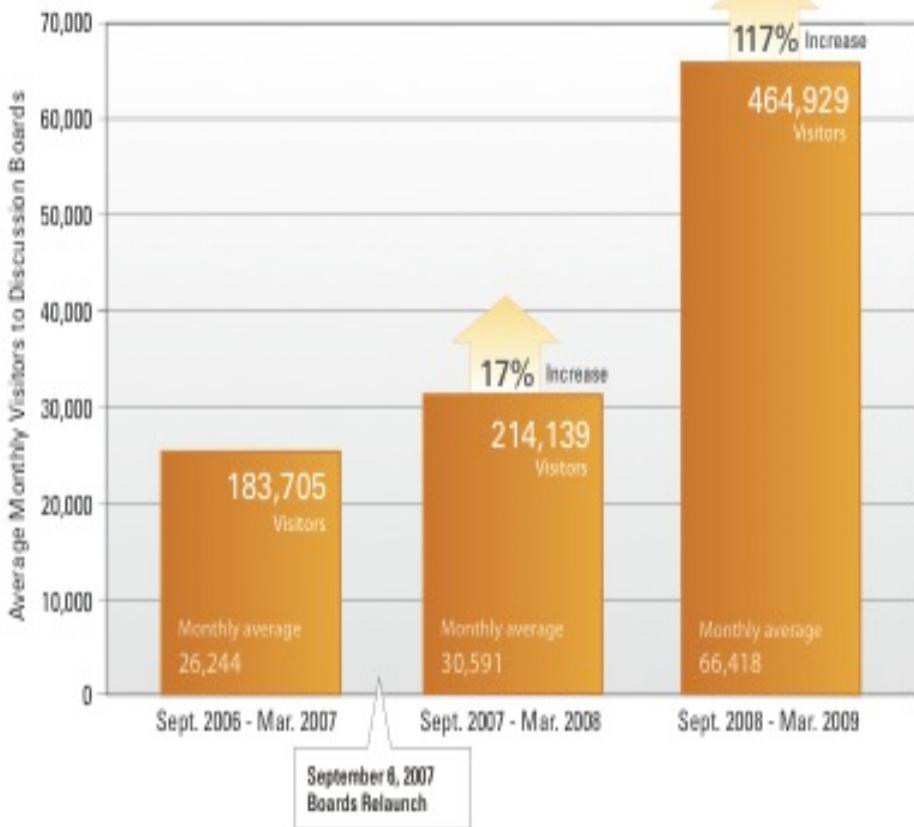
# Usability is important...



# Hope... and Change... and Test!



# breastcancer.org



# HCI/Usability: Return on Investment

- When using HCI (Human-Computer Interaction)/UCD (user-centered design) well
  - Sales double
  - Traffic count *more than doubles*
  - User performance: *Cuts time by more than half*

Nielsen & Gilutz 2006

# HCI/Usability: More numbers

- Improve the usability of outward-facing sites:
  - Average improvement in key performance indicators (KPI): **83%**
  - Typical investment: 10% of development budget
  - Benefit will shift from conversion (first-time customers) to loyalty (repeat customers)
- Improve the usability of internally used software:
  - \$5.4M/year productivity savings

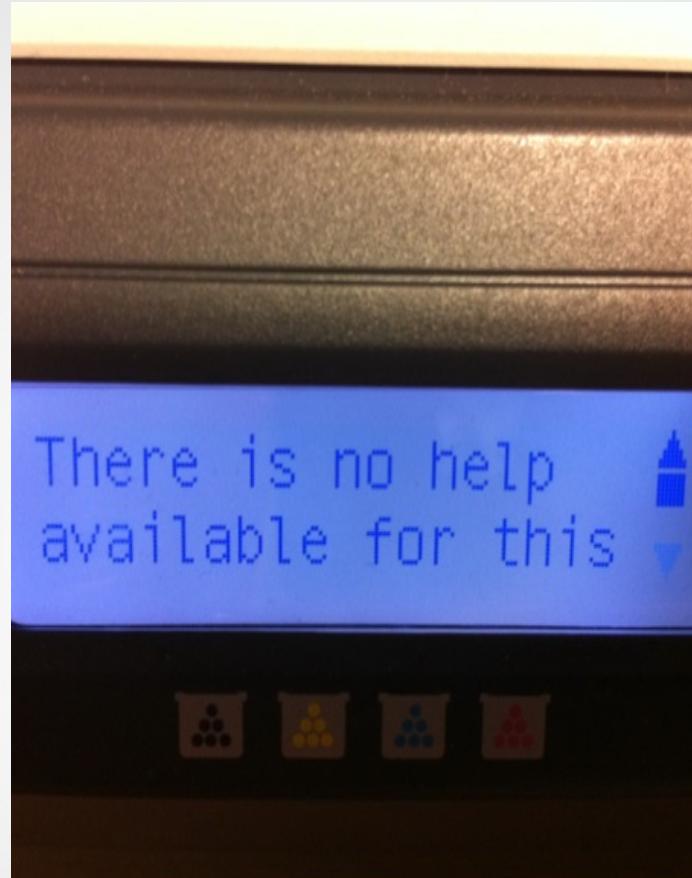
Jakob Nielsen, 2008

# User-centered design works!

- Simple
- Inexpensive
- Higher sales
- Higher satisfaction

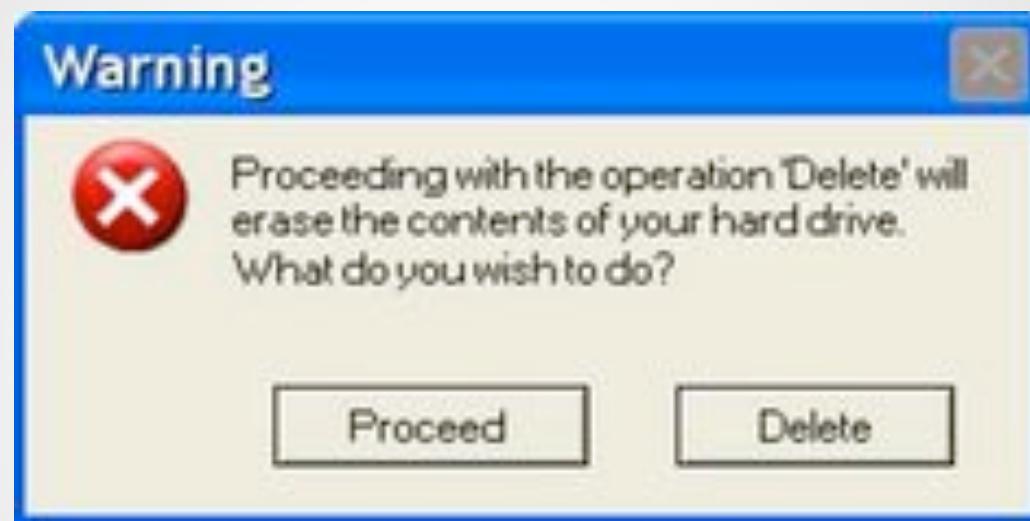
**But sometimes it is not used!**

# Usability Fail



<https://www.youtube.com/watch?v=ejQycd4frgM>

# Usability Fail



# Usability Fail



# Usability Fail



WANT RECEIPT?  
YES OR NO

NO

Help

Yes

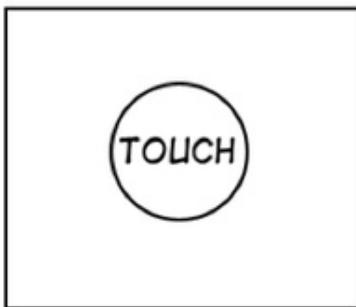


# Usability Fail

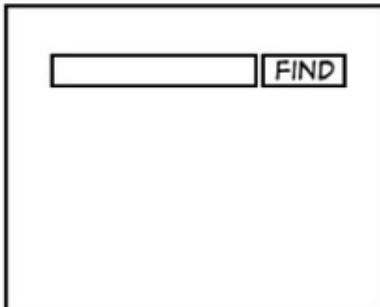


# First Impressions Matter!

TYPICAL APPLE PRODUCT...



A GOOGLE PRODUCT...



YOUR COMPANY'S APP...

FIRST NAME:	[REDACTED]	TYPE CD:	[REDACTED]	4 - K
LAST NAME:	[REDACTED]	TQP STAT:	[REDACTED]	AA2-
SSN:	[REDACTED]	FT/PT:	[REDACTED]	DK9B
ID:	[REDACTED]	VER:	[REDACTED]	KKA?
PHONE 1:	[REDACTED]	CAT CD:	[REDACTED]	CN3
PHONE 2:	[REDACTED]	... CITY:	[REDACTED]	AA-9
ADDR 1:	[REDACTED]	STATE:	[REDACTED]	NEW
ACCT #:	[REDACTED]	ZIP:	[REDACTED]	DEL
ORD #: ● O O ?				OKAY
				APPLY
				SAVE
				LINDO
				HELP
				DELETE
				EDIT
				SELECT
				BROWSE
				ERRORS

STUFFTHATHAPPENS.COM BY ERIC BURKE

# Usability matters!



If it doesn't work for people, it doesn't work!

# Why is Usability Engineering so Hard?

- Usability design is based on
  - Psychology
  - Cognitive science
  - Aesthetics
  - Art
- Software engineers are generally not the audience of the software they develop!

***“Focus on the user, and all else will follow.” -Google***

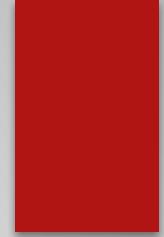
# Today's lecture

- Software Evolution (again)
- Why User-Orientation (Usability) Matters
- User-Oriented (User-Centered) Methods

# HCI: User Centered Design Methods

- Interviews and observations of end users
- Personas
- Scenarios
- Storyboards
- Swimming Lane Diagrams
- Site Map
- Wireframes and Mockups
- Design guidelines
- Heuristic Evaluation
- User testing

# Interviews and observations



# Personas

A persona is a user-archetype, a fictional representation of target users you can use to help guide decisions about product, features, navigation, visual design...

## “Auto Pilot” - Financial Goals



**Joe Jones**

- 34 year old
- Commercial airline pilot
- Married with newborn

- Joe is a 34 year old commercial airline pilot.
- He jokes that he is a “pretty boring guy.”
- Remembers his small town childhood fondly, but is grateful that he moved away when he did.
- Three months ago, their first child was born, an unplanned, but welcome surprise.
- Since the birth of the baby Joe has started to focus on the financial health of the family. He started a college fund for the baby, with small contributions each month.
- Small balances on his credit cards (he usually pays off each month) since the unexpected pregnancy and expenses that come along with preparing for a new family addition. “Who knew that diapers could cost so much?”
- Credit report is rarely considered, but requests copies at milestones, such as home purchase in 2000

**Needs**

- Joe needs **security, comfort, stability and honesty**
- Joe expects **respect and humor**
- Joe hates being **undermined or deceived**

# Personas

- Used during design
- Used during user testing



# Scenarios



## **PERSONAS and SCENARIOS**

Priyanka Chaurasia

### **Mr. Nandan Bagchi**

Mr. Bagchi is in his early forties and has been born and brought up in Calcutta.

He has a degree in psychology but at the start of his career itself he decided to pursue his passion and learning from childhood.

Mr. Bagchi teaches the drums at the Calcutta School of Music.

He also writes a column in the saturday supplement of the Telegraph newspaper circulated in Calcutta.

***Mr. Nandan Bagchi logs onto the internet to vote in the state elections, registers his voter ID number on an official website and casts his vote.***

With the elections being the buzz around the city Nandan Bagchi wants to write a little something about it in his column. He decides he wants to vote for his choice of party.

**He finds an official website online which allows him to cast his vote. He selects the zone he is in from a map on the website, fills in his details of his voter id etc. and is presented with a ballot with the listing of the competing parties. He casts his vote.**

Realizing the convenience of doing this online directs his column at encouraging web users to make uses of voting services provided online and e-democracy.

# Example: Persona: Angela Lee



- 28 year old resident physician at the UCI Medical Center
- passionate about becoming a better physician
- loves working in the Emergency Department
- Enthusiastic about the potential of the new Electronic Medical Records (EMR)
- Used the old system Merlin, but didn't like it because the system took up a lot of her limited free time
- She prefers going home over working to enter required case data into one of the computer stations

# Example: Persona: Dr. Brian Cardinal



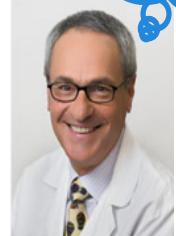
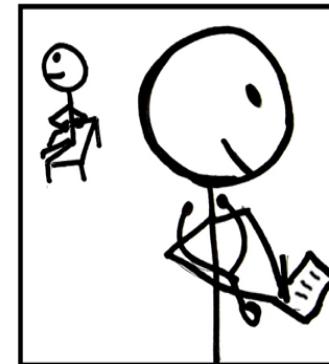
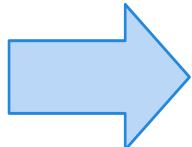
- Emergency Care Physician
- Teaches at the UCI Medical Center, supervises a group of residents
- Moderate computer skills (improved after attending training workshops)
- Outside of EMR, he understands how to download files, surf the web, email attachments
- Spends most time looking after patients and trying to keep track of his residents' progress
- Enjoys golfing (keeps track of his handicap on his new iPhone 6)
- Loves his iPhone 6, starting to learn how to download new apps
- Hoping to find a way to integrate his life with his iPhone 6, so that he can have more time to relax

# Example: Scenario: CaseTrak: Angela Lee

- While eating lunch Angela uses CaseTrak to enter information from a few of her cases today
- She grabs her chart notes and starts the CaseTrak application
- The app makes data entry a lot faster: it is structured and requires less free typing than the Merlin system
- For example, there are fields for acuity, involvement level, age and gender, with all the options given
- She loves that CaseTrak saves the information she entered, so she can go back and add a secondary diagnosis
- While her peers are stuck in front of the Merlin system after work, she'll be on her way home to relax

# Storyboards

## Current Workflow

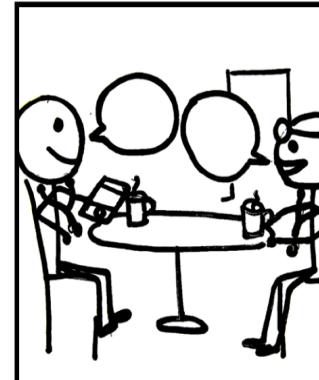
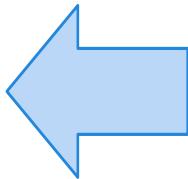
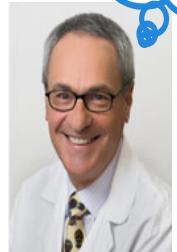
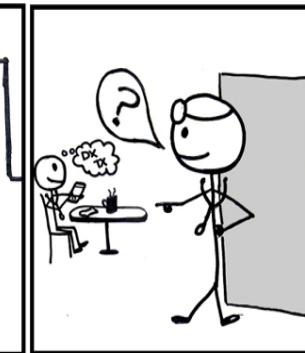
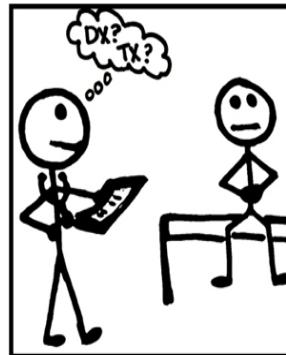


Reports?

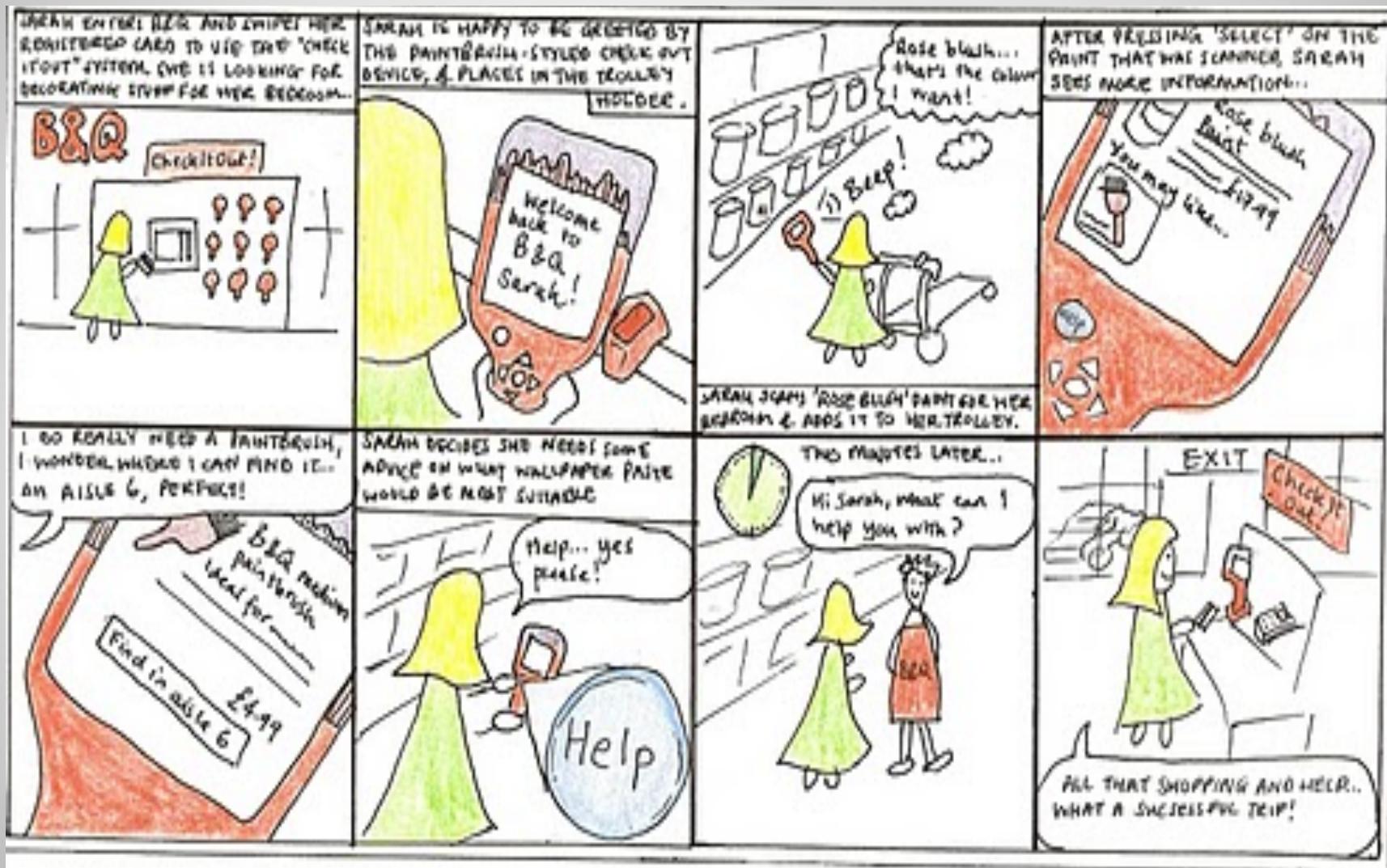


# Storyboards

## Improved Workflow



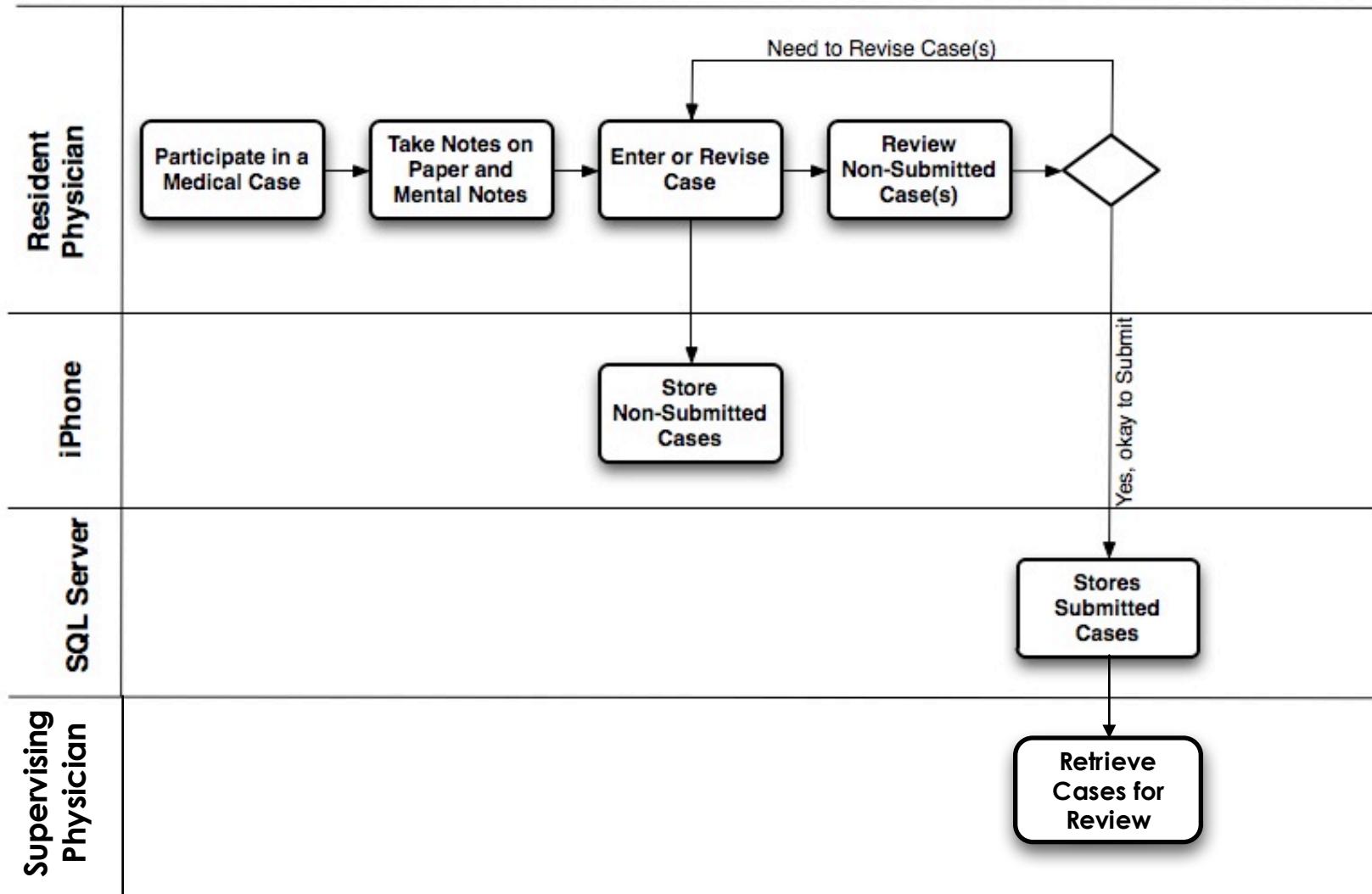
# A Storyboard



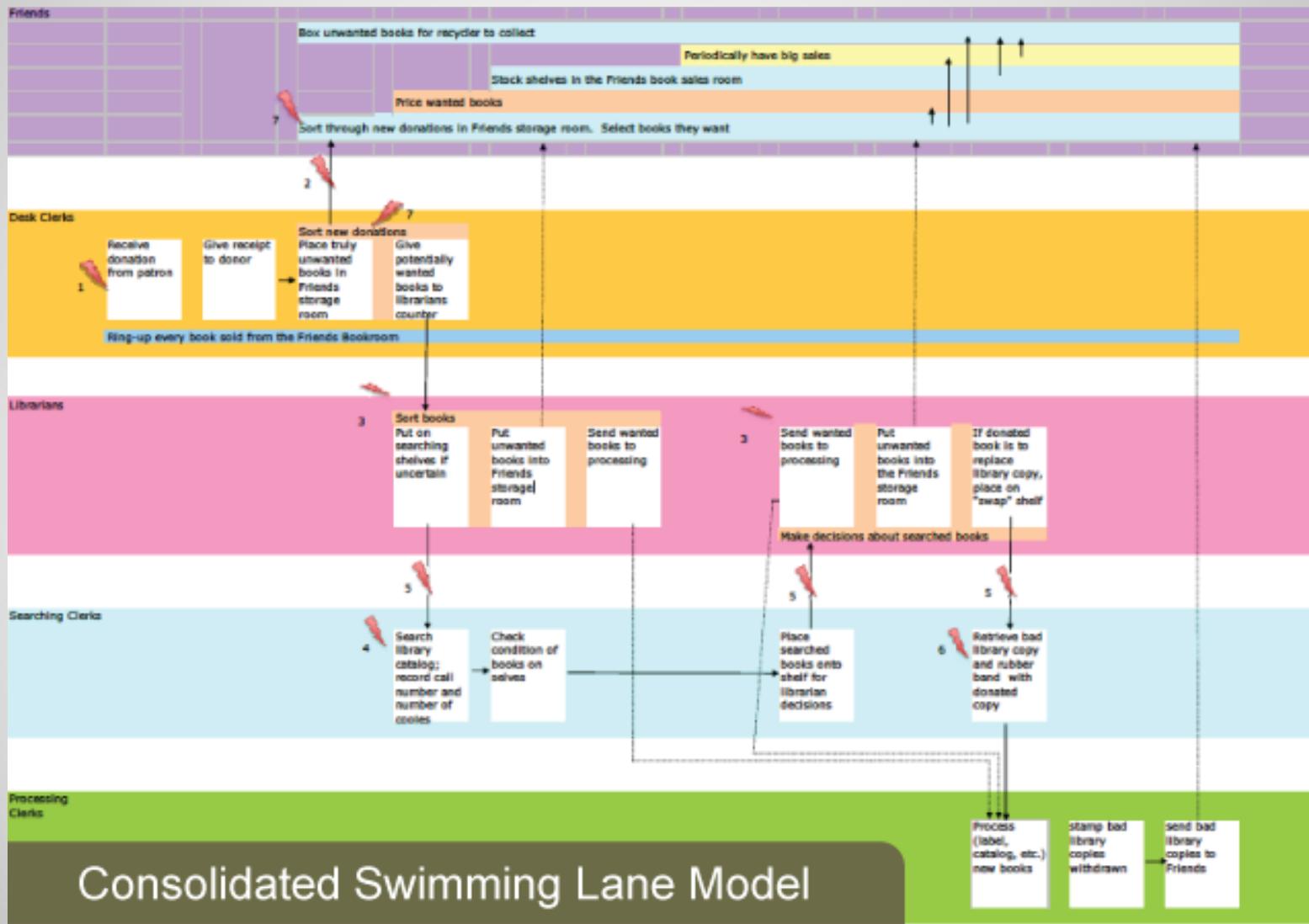
# Another Storyboard



# Swimming Lane Diagrams

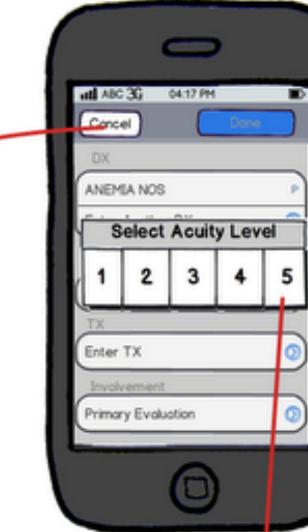
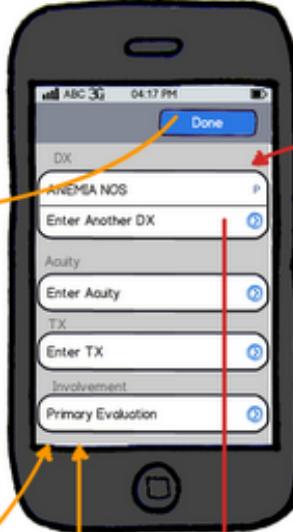
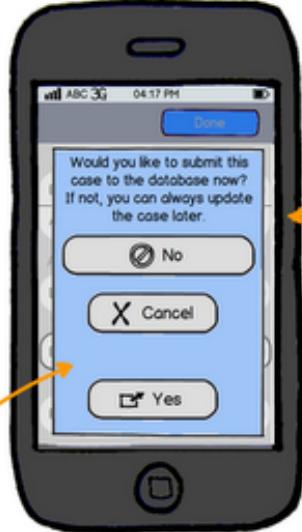
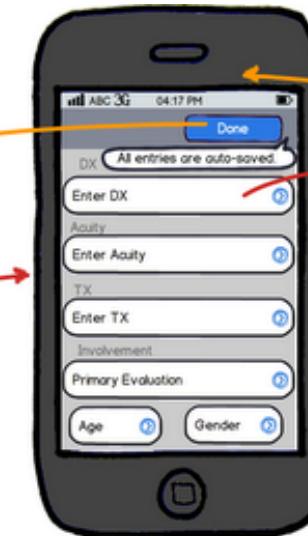


# Swimming Lane Diagram



# SiteMaps

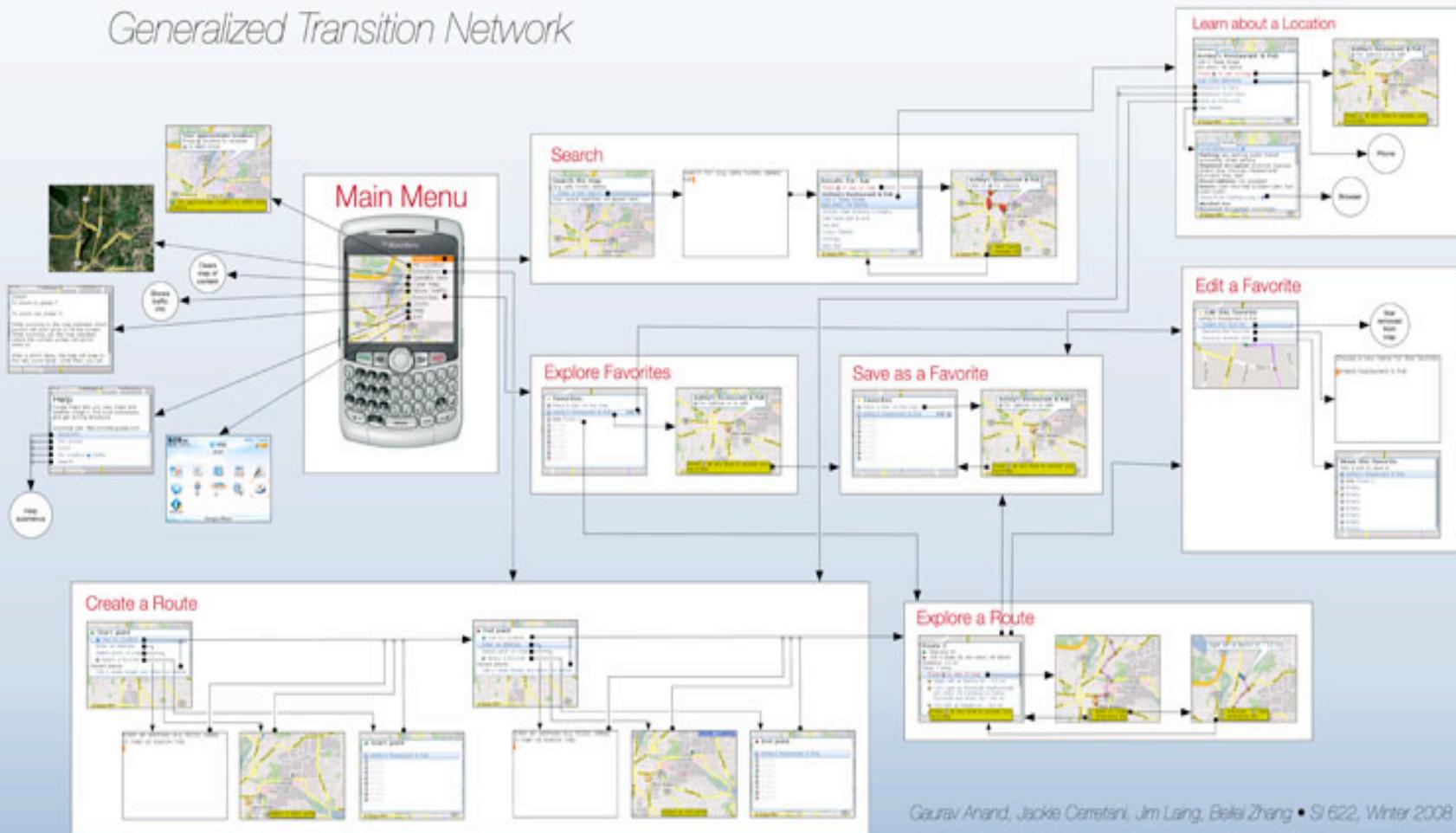
Start!



# Site Map

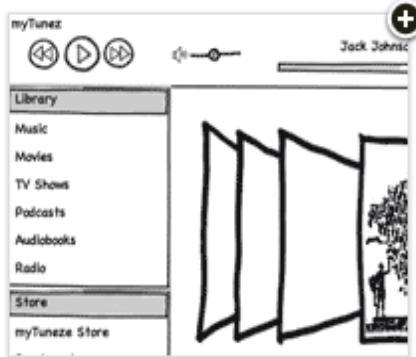
## Google Maps For Mobile

Generalized Transition Network

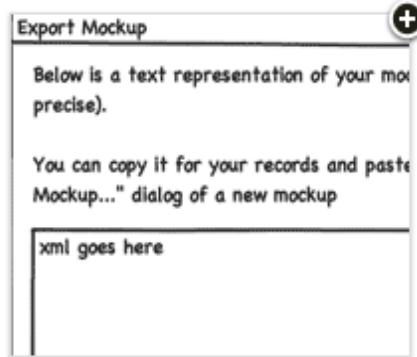


# Mockups

See what you can build with Balsamiq Mockups #



Desktop Apps



Dialogs



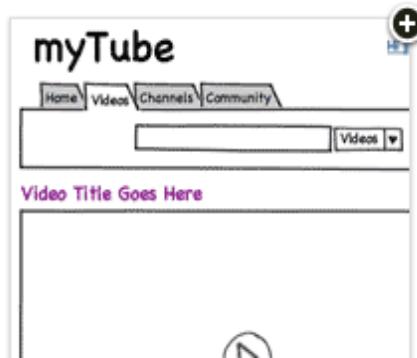
Web Sites



Web Sites



Web Sites



Web Sites

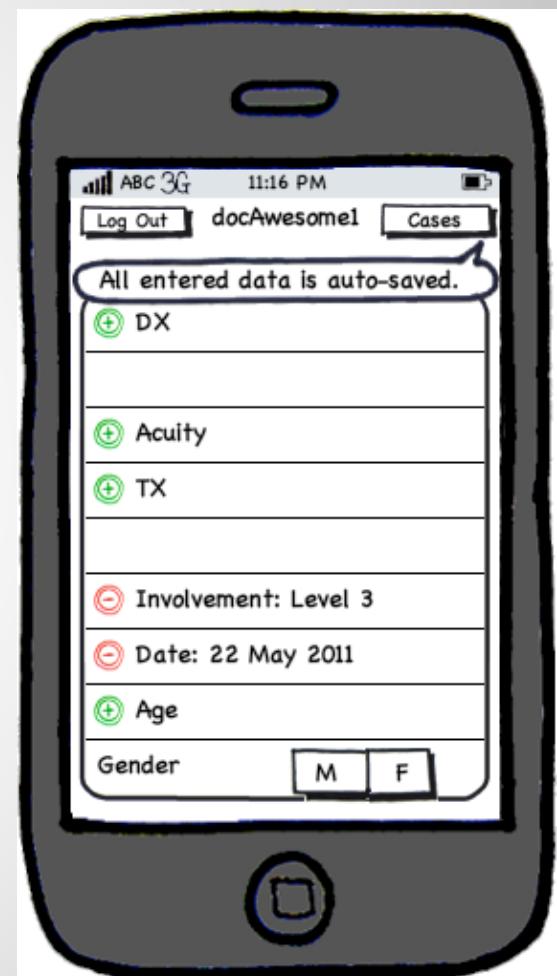
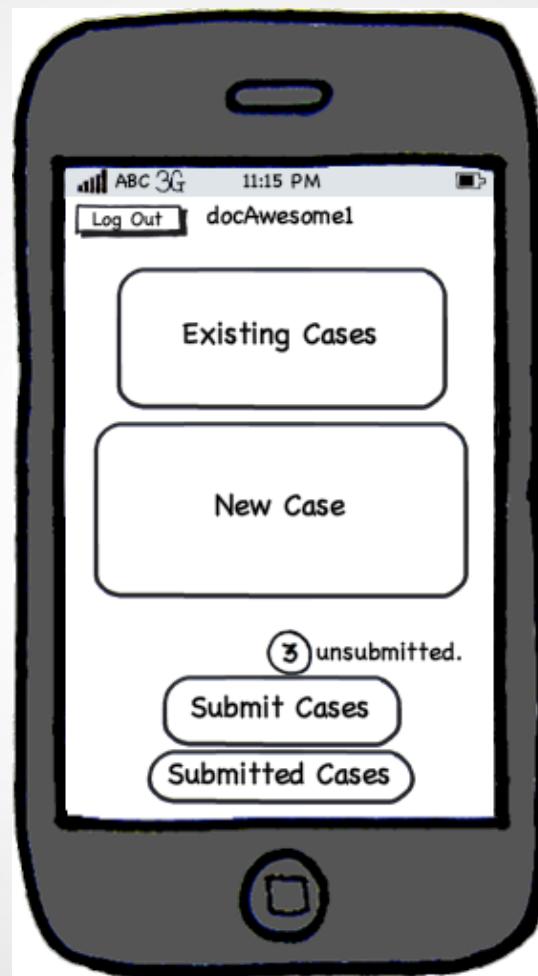
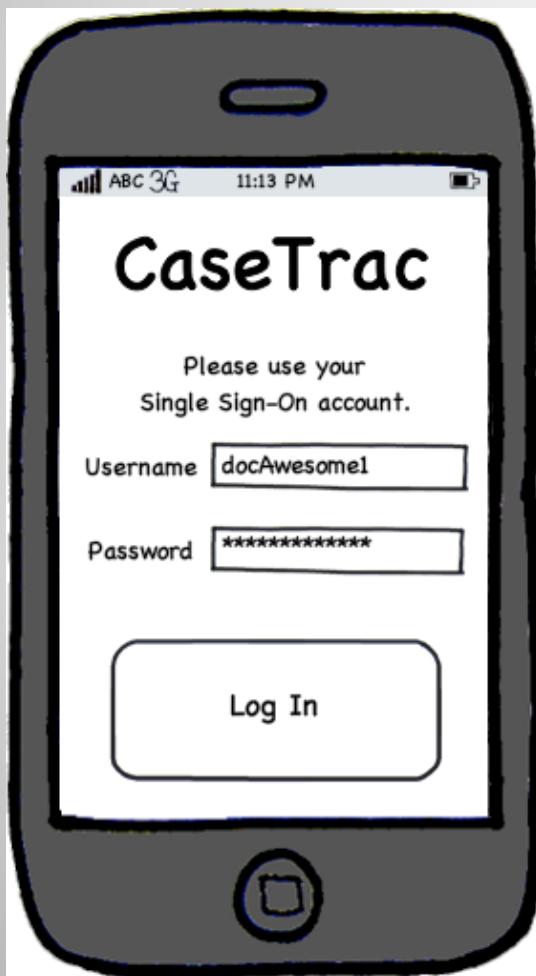


iPhone Apps



Rich Internet Applications

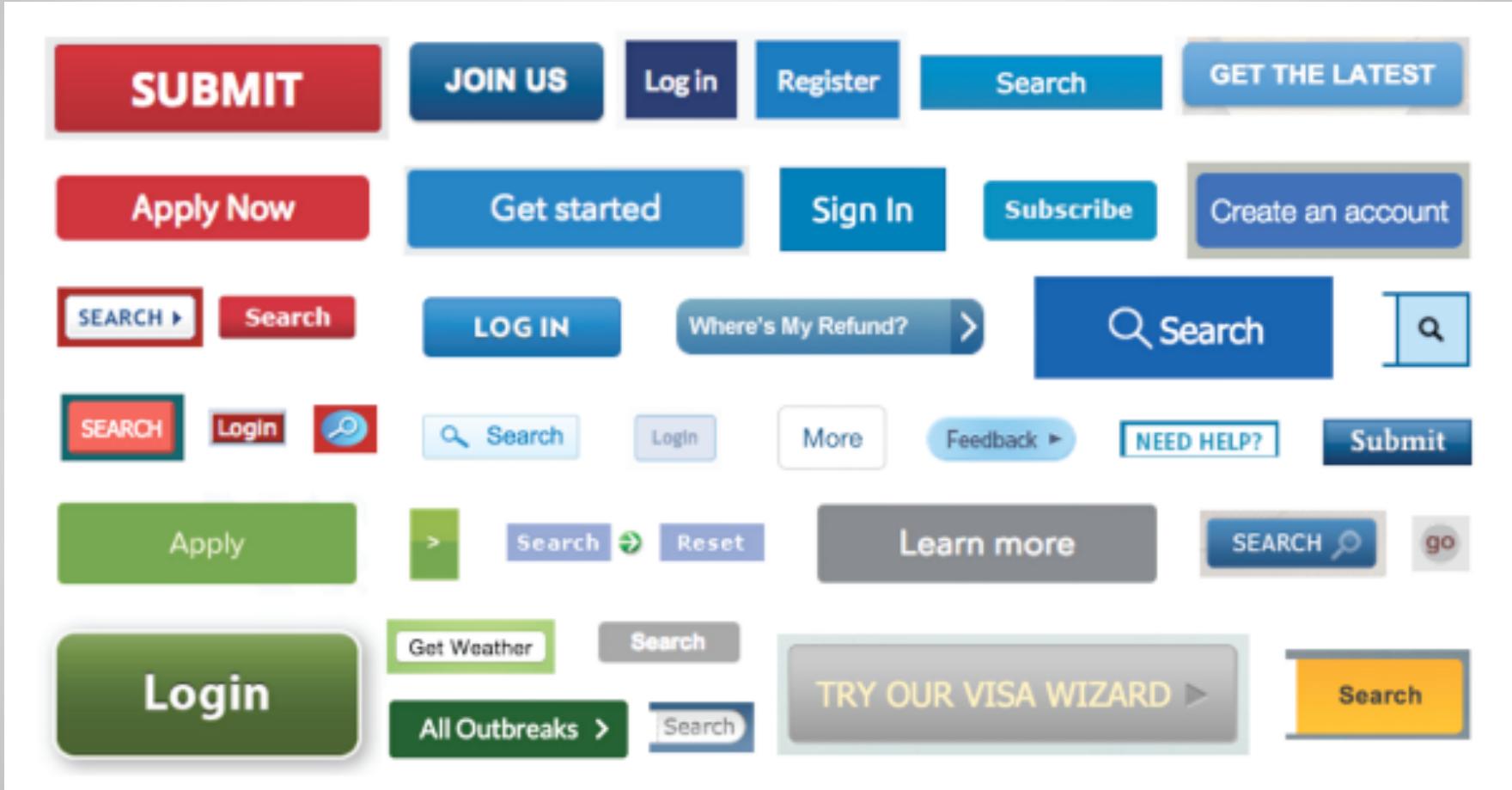
# CaseTrak: Mockups (before testing)



# CaseTrak: Mockups (after testing)



# Design Guidelines - Before



# Design Guidelines - After



Source: <https://medium.com/@USDigitalService/introducing-u-s-web-design-standards-aff21383af6#.lk46cpato>

# Design Guidelines – Color Palette

An official website of the United States Government

This site is currently in alpha. [Learn more.](#)

## U.S. Web Design Standards

[Download code](#)

[View on GitHub](#)

Getting started

**Visual style**

Typography

Typefaces

Pairings and styles

Typesetting

Links

Lists

Colors

Palette

Text accessibility

Grid

Buttons

### Primary colors

This palette's primary colors are blue, gray and white. Blue is commonly associated with trust, confidence, and sincerity; it is also used to represent calmness and responsibility.



#0071bc  
primary



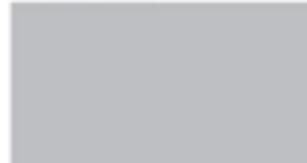
#205493  
primary-darker



#112e51  
primary-darkest



#212121  
base



# Design Guidelines - Wireframe

Password Reset wireframe: Form field configurations

## Reset Password

Please enter your new password.

New Password

.....

Confirm Password

Show My Typing

3.0

Passwords must:

- Be at least 8 characters
- Have at least 1 uppercase character
- Have at least 1 numerical character
- Another requirement

1.0

2.0

Reset Password

4.0

1.0 **Show password requirements up front.** Let users know what they need to include in their passwords to help them avoid getting slapped with errors after the fact.

2.0 **Show progress towards creating a valid password.** Show users their progress towards creating a valid password by checking off the requirements they meet as they type. E.g. Once a user types at least 8 characters into the top field, a checkmark appears next to the first line. (This box can also work for informational purposes if interactivity is unavailable.)

3.0 **Show typing.** Allowing users to show their typing will support memory and allow users to check their work. It will also reveal typos. Clicking "Show My Typing" will turn off masking in both fields.

4.0 **Disable until valid.** Disabling the submit button until the form is valid helps prevent error states.

## References

1. **Password Creation: 3 Ways To Make It Easier** <http://www.nngroup.com/articles/password-creation/>

2. **Security & Human Factors** <http://www.nngroup.com/articles/security-and-human-factors/>

# Design Guidelines - Code

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[View on GitHub](#)

Getting started

Visual style

Grid

Buttons

Labels

Tables

Alerts

Accordions

### Form controls

Text inputs and area

Dropdown

Checkboxes

Radio buttons

### Code

```
<label for="input-type-text">Text input label</label>
<input id="input-type-text" name="input-type-text" type="text">

<label for="input-focus">Text input focused</label>
<input class="usa-input-focus" id="input-focus" name="input-focus" type="text">

<div class="usa-input-error">
  <label class="usa-input-error-label" for="input-error">Text input error</label>
  <span class="usa-input-error-message" id="input-error-message" role="alert">Helpful error message</span>
  <input id="input-error" name="input-error" type="text" aria-describedby="input-error-message">
</div>

<label for="input-success">Text input success</label>
<input class="usa-input-success" id="input-success" name="input-success" type="text">

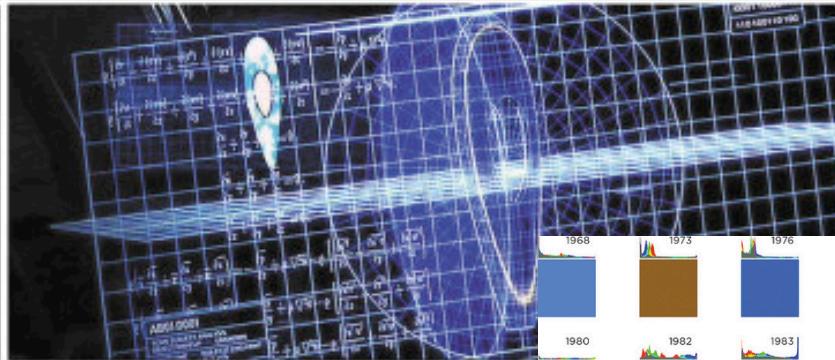
<label for="input-type-textarea">Text area label</label>
<textarea id="input-type-textarea" name="input-type-textarea"></textarea>
```

### Documentation

# Heuristic Evaluation: Inspection Methods

- Select tasks
- Someone plays the user
- Evaluators focus on an aspect
- Someone takes notes
- More on evaluation...
  - User orientation discussion
  - Lectures on testing

# Heuristic Evaluation?



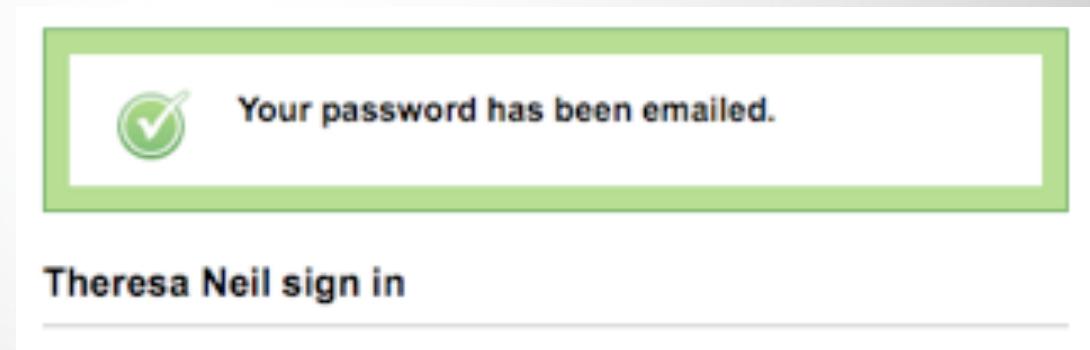
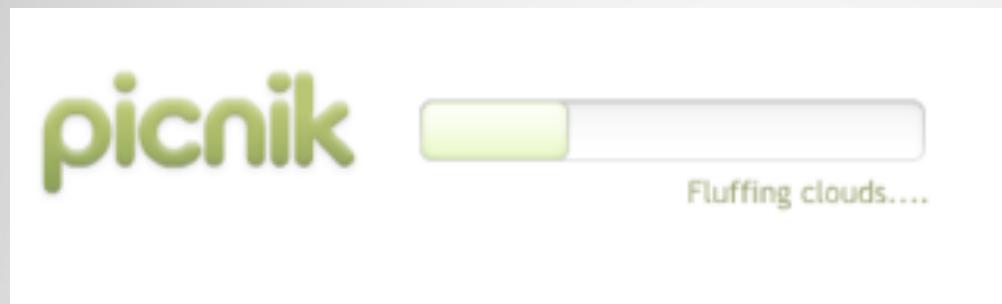
Source: <http://99percentinvisible.org/episode/future-screens-are-mostly-blue/>

# Heuristic Evaluation (Nielsen)

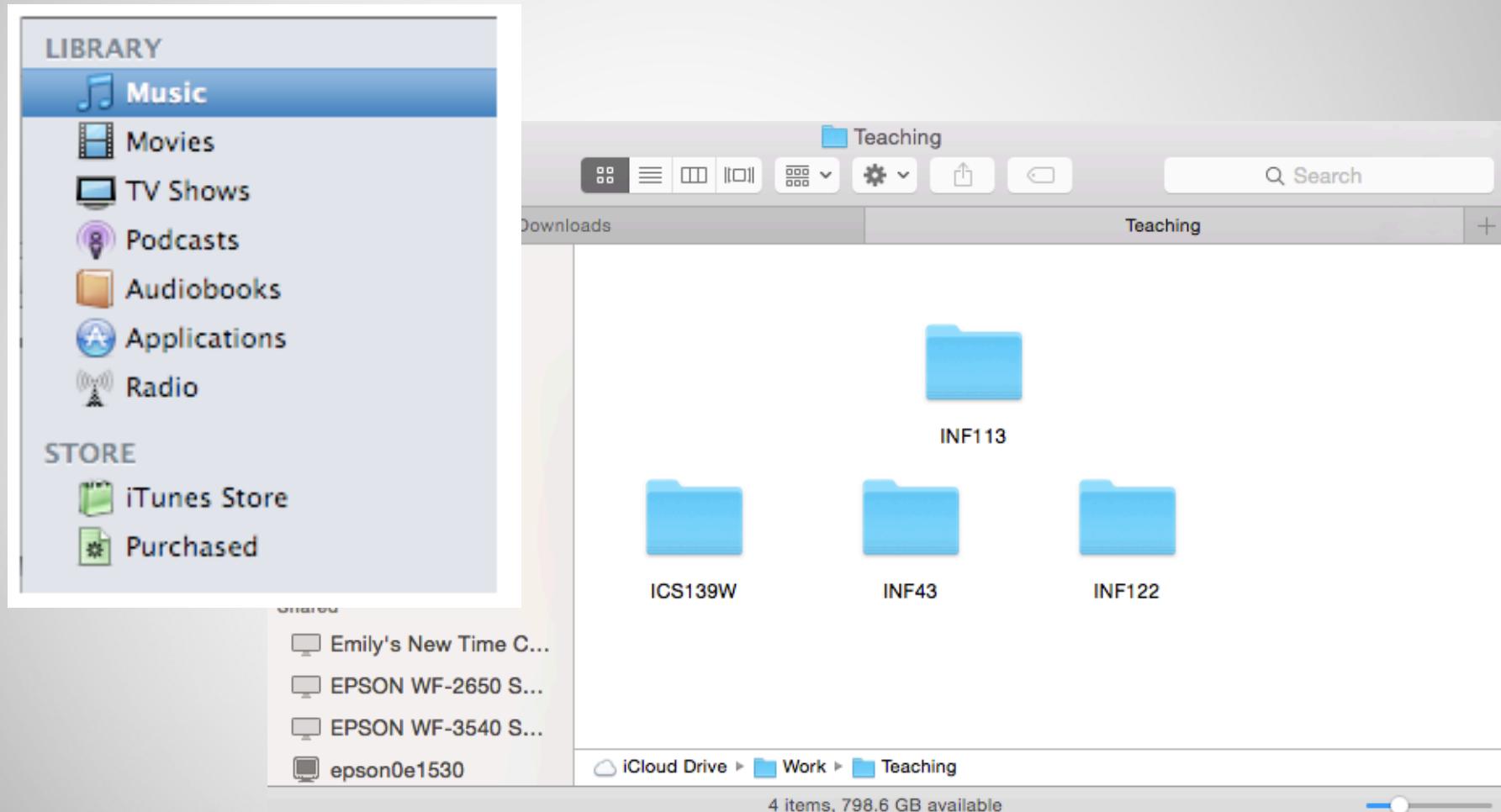
- Visibility of system status
- Match system words to the real world
- User control and freedom
- Consistency and standards
- Error prevention
- Recognition rather than recall
- Accelerators
- Minimalist design
- Help users recognize and recover from errors
- Help and documentation



# Visibility of System Status



# Match Between System and Real World



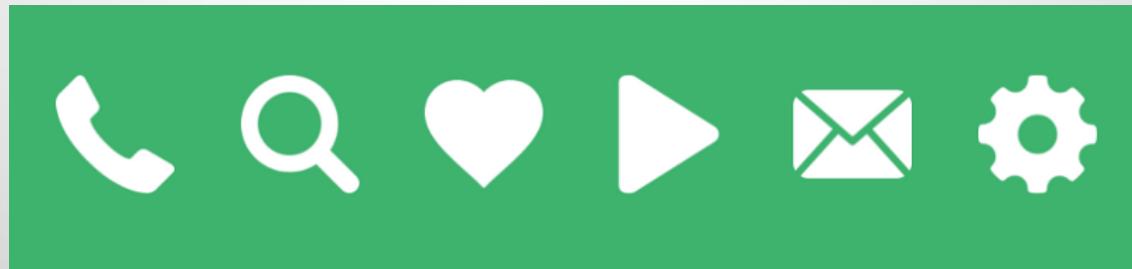
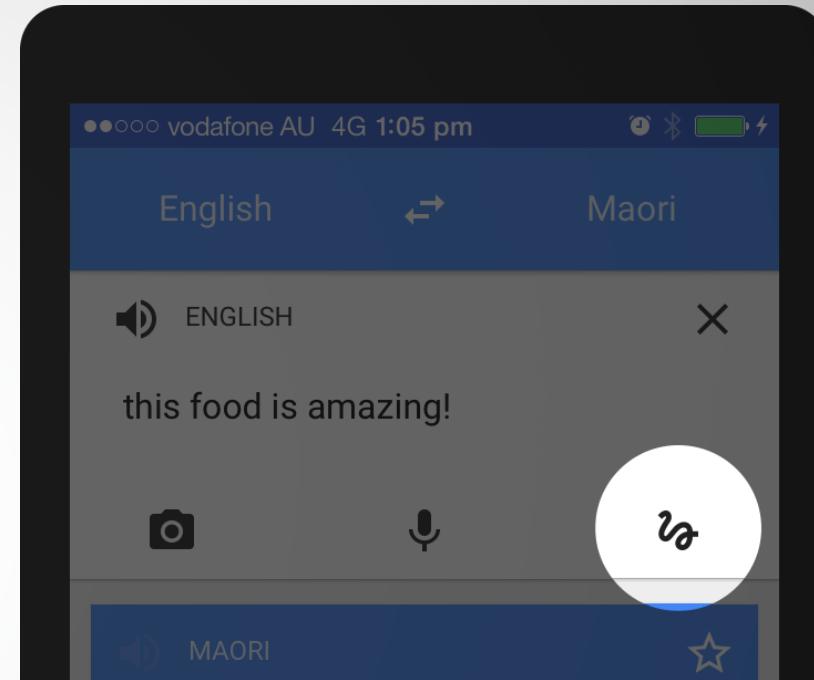
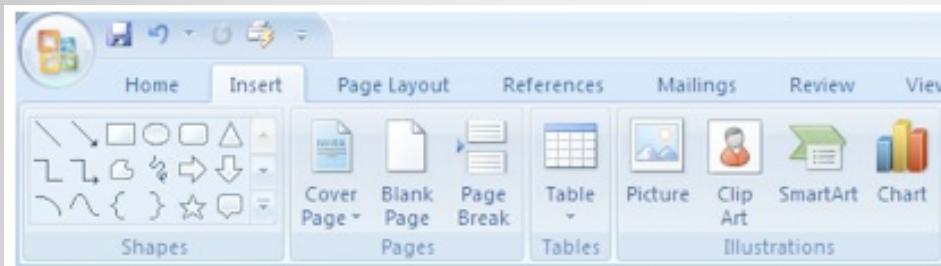
# User Control and Freedom

The screenshot shows the Wufoo Form Gallery interface. On the left, there's a sidebar with links for Home, Gallery, Templates, Form, Surveys, Invitations, Registrations, Lead Generation, and Online Orders. The main area is titled "Survey TEMPLATES" and lists six templates numbered 1 to 6: Customer Satisfaction Survey, Cancellation Survey, Business Demographic Survey, Web Site Visitor Survey, Tech Support Satisfaction Survey, and Health Survey. At the bottom right of this section are "Download HTML" and "Add to Wufoo" buttons. Below this, a red banner says "WUFOO" and "Customer Satisfaction Survey". It asks users to take a few moments to complete the satisfaction survey.

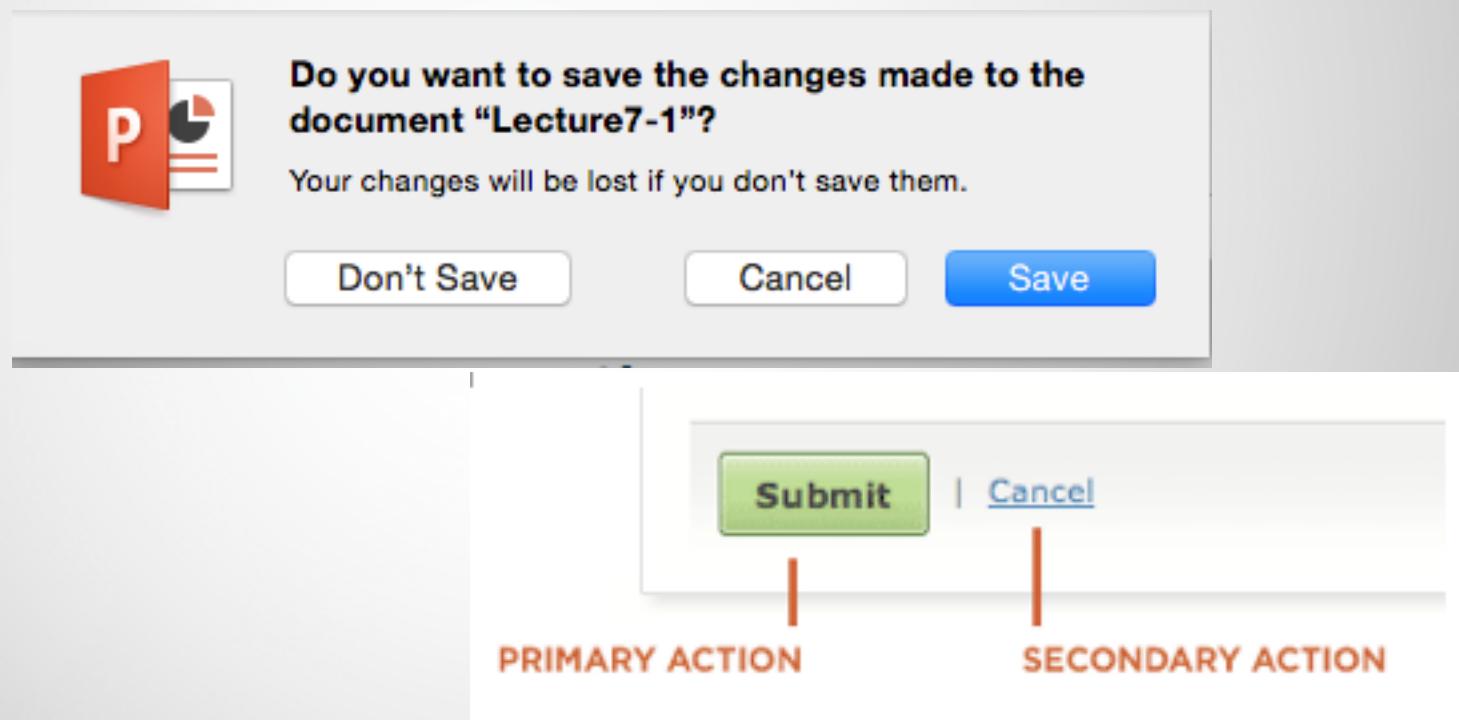
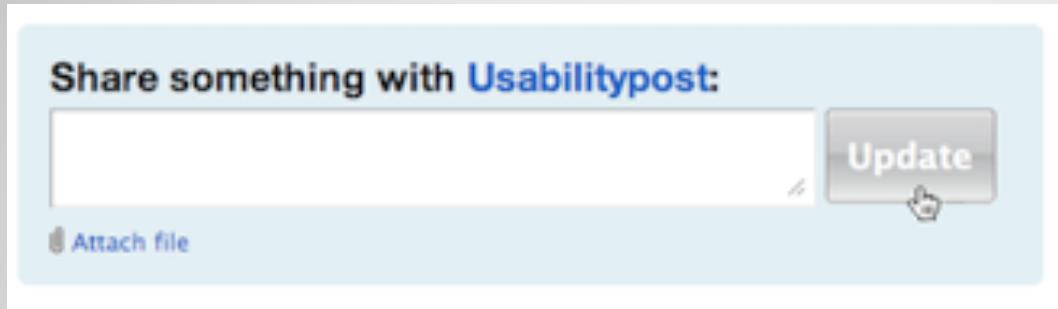
This screenshot shows a Safari browser window. The title bar says "Safari". Below it are the standard Mac OS X window controls (red, yellow, green buttons). The menu bar includes File, Edit, View, and History. The main content area shows the Google homepage with the search bar containing "Search" and the "Google" logo at the bottom.

This screenshot displays a user interface component library. At the top, there's a toolbar with icons for Back, Forward, Stop, Refresh, and other common browser functions. Below the toolbar, tabs are labeled "Buttons", "Common", "Containers", "Layout", and "Markup". Under the "Buttons" tab, there's a "Button" example and a "Button Bar" example consisting of two buttons labeled "One" and "Two". To the right, there's a "Calendar" component showing a month view for February 2008, with days 1 through 28 listed. A red arrow points from the "Customer Satisfaction Survey" section in the top screenshot down to the "Buttons" tab in this screenshot.

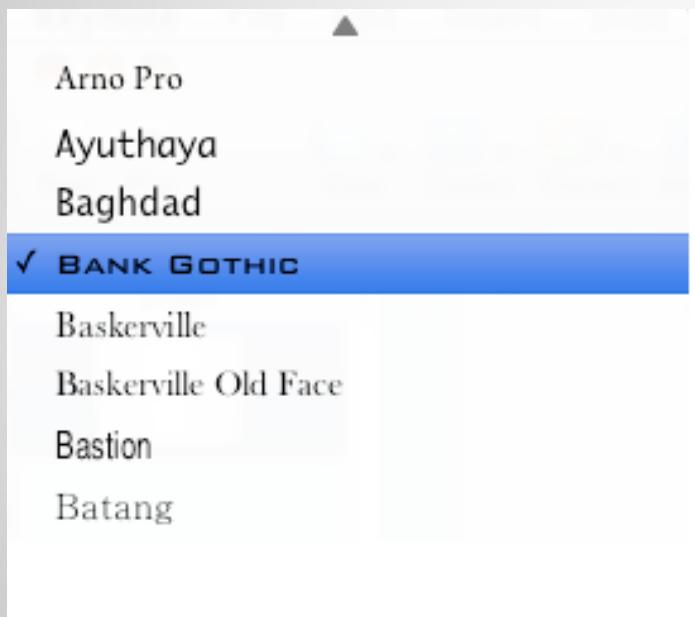
# Consistency and Standards



# Error Prevention



# Recognition Rather than Recall



A screenshot of a code editor. A dropdown menu is open at line 13, showing various string manipulation functions: stat, str\_pad, str\_repeat, str\_replace, str\_rot13, strcasecmp, strchr, strcmp, strcoll, strcspn, strftime, and strip\_tags. The code editor shows some HTML-like code with attributes like \$maxcol = 5; and style="display: inline-block; width: 100%;". The background is light gray.

```
12 |     $maxcol = 5;
13 |     st
stat
str_pad
str_repeat
str_replace
str_rot13
strcasecmp
strchr
strcmp
strcoll
strcspn
strftime
strip_tags
)
; $i++) {
    ease ". Spendin
g3C//DTD HTML 4
title>
t-Type" content
content="Quanta :
rpe="text/css" :
Her="0" cellpadding
ght">
```

# Accelerators

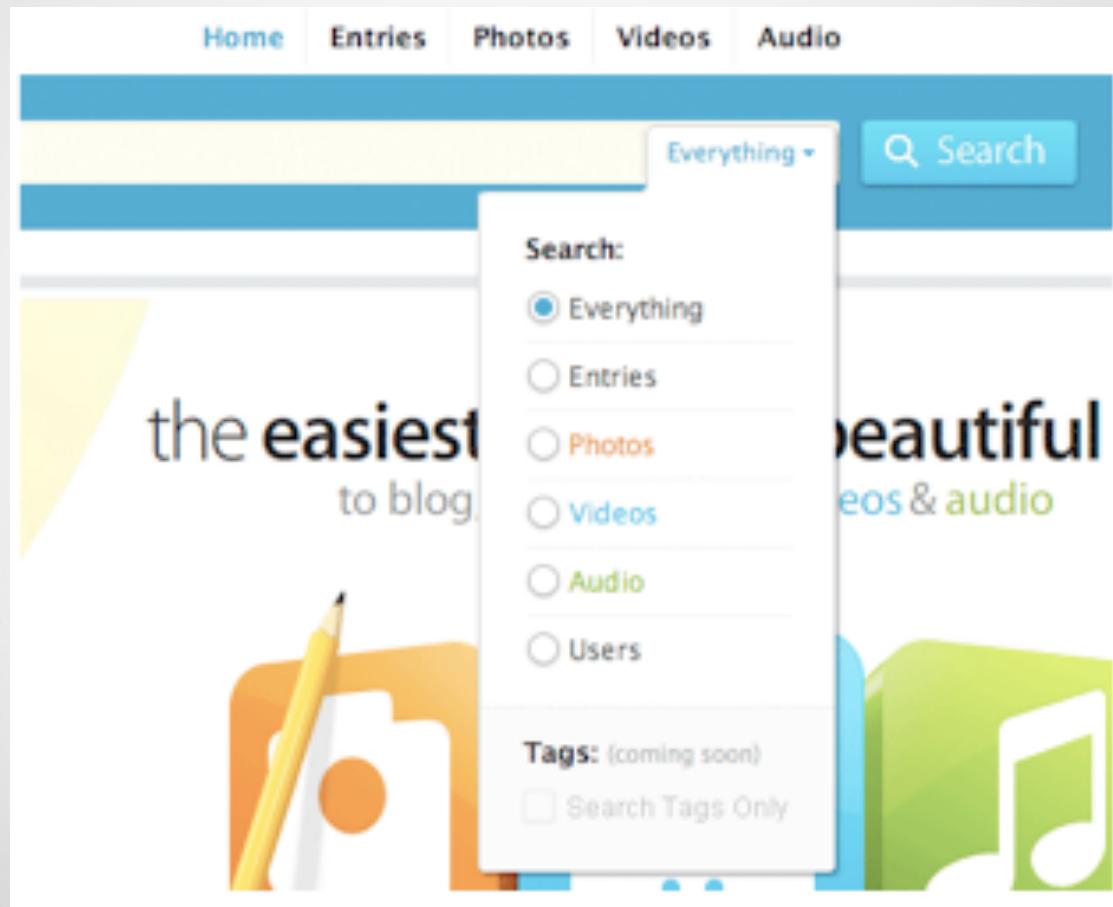
## Common Shortcuts

Add Action	Return
New Window	⌘N
Synchronize with Server	⌃⌘S
Clean Up	⌘K
Planning Mode	⌘1
Context Mode	⌘2
Inbox	⌥⌘1
Quick Entry	⌃⌥Space

*Quick Entry's shortcut can be customized in Preferences*

# Minimalist Design

Principles: contrast, repetition, alignment, and proximity.



# Help Users Recognize/Recover from Errors

Or start a new account

Choose a username (no spaces)

bert

**⚠** bert is already taken. Please choose a different username.

Choose a password

\*\*\*

**⚠** Passwords must be at least 6 characters and can only contain letters and numbers.

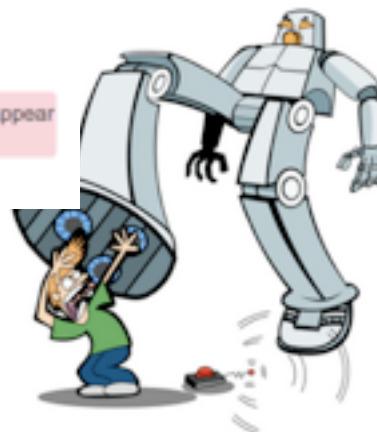
Retype password

Email address (must be real)

not an email

**⚠** The email provided does not appear to be valid

Send me occasional Digg updates.



## Oh no!

It seems the page you were trying to find on my site isn't around anymore (or at least around here).

[Report it missing using my contact form](#) and I'll see what I can do about it.

Whilst you're here why not check out my [articles listing](#) or [browse my blog](#)? You never know - you may just

# Help and Documentation

The screenshot shows a software interface with a toolbar at the top containing 'Quality: Normal', 'Print', a question mark icon, 'Undo', 'Redo', and 'Done!' buttons.

A modal window titled 'Welcome to Picnik Collages!' is displayed. It contains the text 'Making collages from your photos has never been easier.' and three thumbnail images: a 2x2 grid of flowers, a 3x3 grid of various photos, and a large image of a yellow flower.

The modal also shows '1 of 8' and a 'next' button.

A yellow tooltip box is overlaid on the right side of the screen. It has a title 'Which one is right for me?' with a close button. Inside, there are three bullet points: 'Use Windows when ...', 'Use SNMP for ...', and 'SSH works best for ...'. Below the tooltip is the text 'the following:' followed by a question mark icon with a cursor arrow pointing towards it.

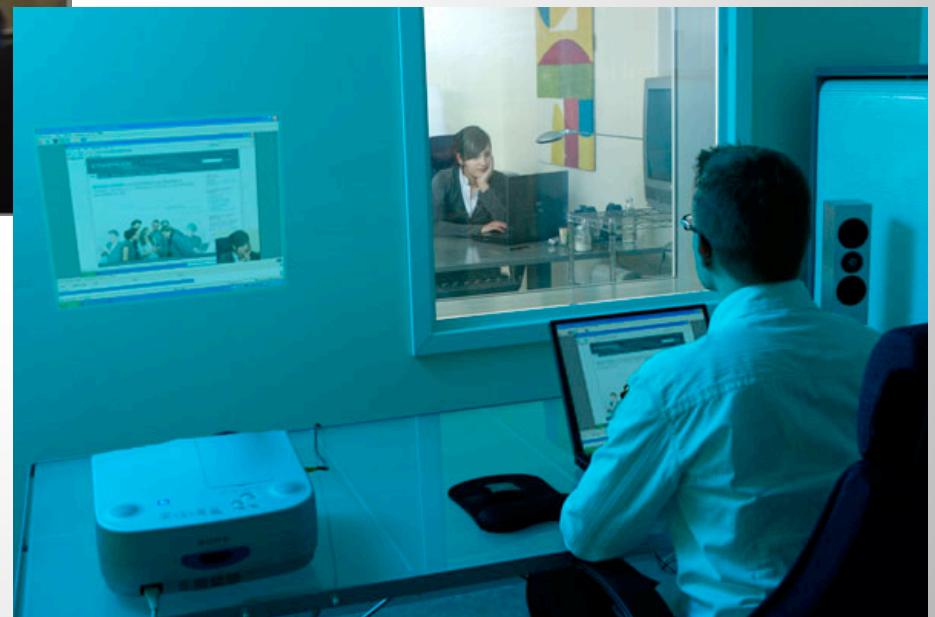
# Before testing with real users

- Checklists, Heuristic Evaluation
- Cognitive Walkthrough

# User Testing

- Improve designs and interfaces before showing to users!
  - Checklists, heuristic evaluation
  - Cognitive walkthrough
- Planning the user testing
  - Subjects
  - The system
  - Tasks
  - The session
  - Measures taken

# User Testing Facilities – Professional Usability Labs



# (Less Formal) User Testing

The dashboard displays various metrics and user interface snippets across four main sections: Engagement, Screens, Outcomes, and In-App Revenue.

### Engagement

**User Engagement**

● Avg. Session Duration ● Screens / Session

Date	Avg. Session Duration	Screens / Session
May 8	00:20:00	10.00
May 10	00:10:00	10.00
May 12	00:10:00	10.00
May 14	00:10:00	10.00
May 16	00:10:00	10.00
May 18	00:10:00	10.00
May 20	00:10:00	10.00
May 22	00:10:00	10.00
May 24	00:10:00	10.00
May 26	00:10:00	10.00
May 28	00:10:00	10.00
May 30	00:10:00	10.00

### Screens

Screen Name	Screen Views
AnalyticsMainActivity	17,669
Profile Picker	12,299
Line Chart Settings	3,259
Alert Viewer	3,222
Login	1,891

### Outcomes

**Goal Completions**

Date	Goal Completions
May 8	~10
May 10	~10
May 12	~10
May 14	~10
May 16	~10
May 18	~10
May 20	~10
May 22	~10
May 24	~10
May 26	~10
May 28	~10
May 30	~10

### In-App Revenue

Date	In-App Revenue
May 8	\$0
May 10	\$0
May 12	\$0
May 14	\$0
May 16	\$0
May 18	\$0
May 20	\$0
May 22	\$0
May 24	\$0
May 26	\$0
May 28	\$2,000
May 30	\$0

# (Informal) User Testing

<https://www.youtube.com/watch?v=9wQkLthhHKA>

# Summary

- We use HCI/UCD methods...
  - Interviews/observations, personas, scenarios, storyboards, swimming lane diagrams, site maps, mockups, design guidelines, heuristic evaluation, user testing
- ...for good reasons
  - Sales double
  - Performance doubles
  - Traffic counts increase
- It's all about the user!

# Next Time

- Testing (1 of 3 lectures)