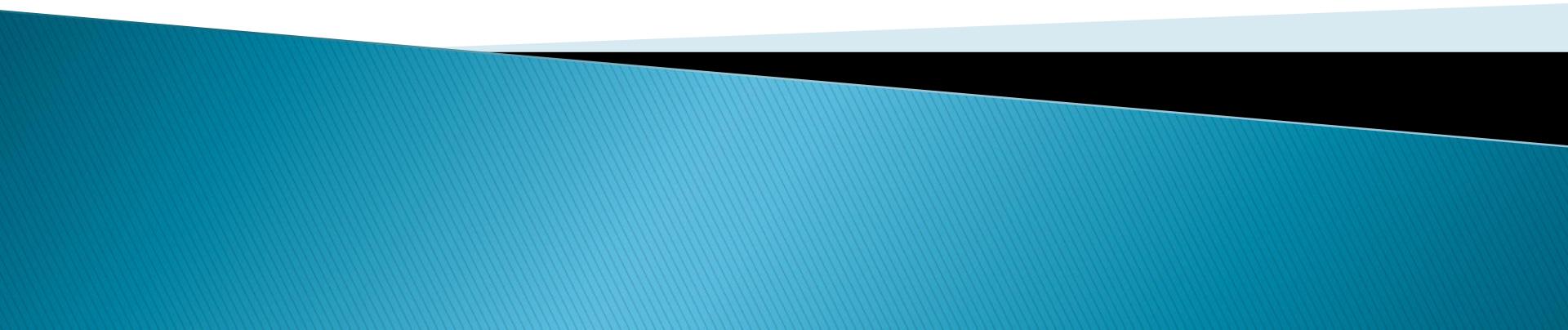


Designing Mobile Applications



Don't believe me, believe Google!



Google programmers are doing work on mobile applications first because they are better apps and that what top programmers want to develop.

Eric Schmidt

Why starting with mobile?

- ▶ Growth = Opportunity
- ▶ Constraints = Focus
- ▶ Capabilities = Innovation

Considerations

- ▶ Multiple screen sizes and densities
- ▶ Performance optimization
- ▶ Touch targets, gestures and actions
- ▶ Location systems
- ▶ Device capabilities

Growth = Opportunity



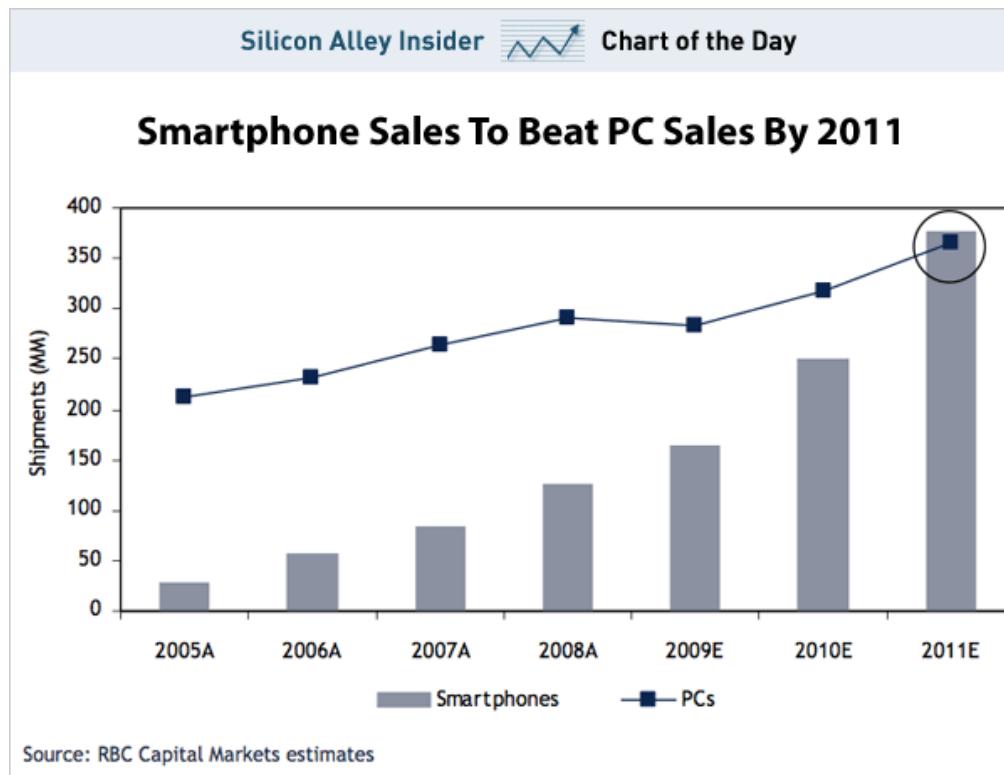
Growth = Opportunity



In next years up to 90% of the mobile market will be smartphones

Growth = Opportunity

- ▶ Mobile web growth has outpaced desktop web growth 8x



Growth = Opportunity

- ▶ People come online on mobile first on new markets.



Constraints = Focus



Constraints = Focus

- ▶ Screen size
 - Focus on core actions
 - Know your users
 - Use scalable design

Constraints = Focus

Create a product!

Don't just reimagine one for small screens.

Great products are created from scratch never ported!

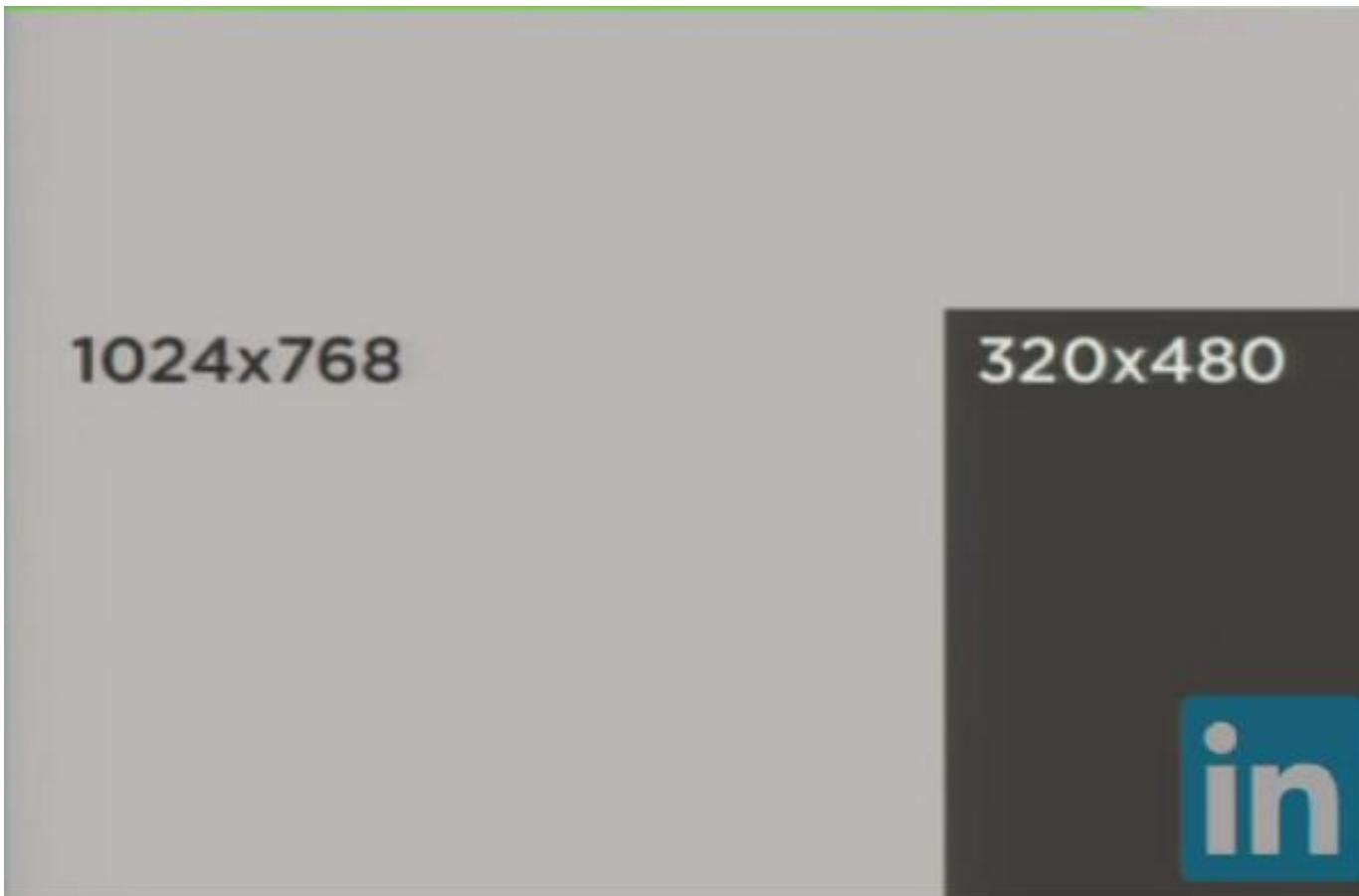




My goal was initially just to make a mobile companion, but I became convinced that it was possible to create a version of FB that was actually better than the website.

Joe Hewitt

Screen size



Focus on core actions

- ▶ The main function should be immediately apparent !!

Focus on core actions

The screenshot shows the Southwest.com homepage with a focus on travel deals and rewards. At the top, there's a search bar with "Search Southwest" and a "GO" button. Below it is a navigation menu with links for Air, Car, Hotel, Vacations, Travel Guide, and Rapid Rewards®. The main content area features a large banner for "Get A Free Holiday Photo Before You Fly" with a "Learn More" button. To the left, there's a search form for Air travel with fields for "From" and "To" locations, departure and return dates, and passenger counts. Below the search form, there's a "News" section with a note about scratch-off bags. On the right, there are sections for "Quick Air Links" (Check In, Change Flight, Check Flight Status), "My Account" (Enroll Now!), and "Manage Travel", "Rapid Rewards", and "Travel Guide" buttons. There are also promotional boxes for "Las Vegas Jackpot Packages" and "Play Cart Commander".

Focus on core actions



Focus on core actions

Bank of America

Locations • Contact Us • Help • [Sign In](#) • En Español

Enter keyword(s)

PERSONAL ▾ SMALL BUSINESS ▾ CORPORATE & INSTITUTIONAL ▾ ABOUT BANK OF AMERICA ▾

Online Banking

Easy. Secure. Free.
[Enroll](#) View demo | Learn more

Enter Online ID:

 Save this Online ID
Account in:
Where do I enter my Passcode?
[Sign In](#)

Forgot or need help with your ID?
[Reset Passcode](#)

Your Privacy & Security
Report phishing email
McAfee® - 1 year free
Know your credit scores
Our security commitment

ATMs & Banking Centers
Enter ZIP code or city, state Go
More search options

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Search for a Home
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Get a \$50 statement credit after qualifying transaction(s). [Get started >](#)

Bank safer online: Online Banking offers guaranteed security. [Learn more >](#)

UP TO 20% CASH BACK
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Notice Of Changes In Temporary FDIC Insurance Coverage For Transaction Accounts. [Learn More >](#)

As of January 1, 2010 Bank of America no longer participates in the FDIC's Transaction Account Guarantee Program. Coverage under the FDIC's basic deposit insurance rules continues to apply. [Learn More >](#)



Carrier 3:03 PM

Bank of America

Main Menu

[Mobile Banking Sign In](#)

[Locations Near Me](#)

[What is Mobile Banking?](#)

[About Bank of America](#)

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Focus on core actions



- ▶ 60 menu items on the actual website
- ▶ 9 items on the mobile version



App design matters!

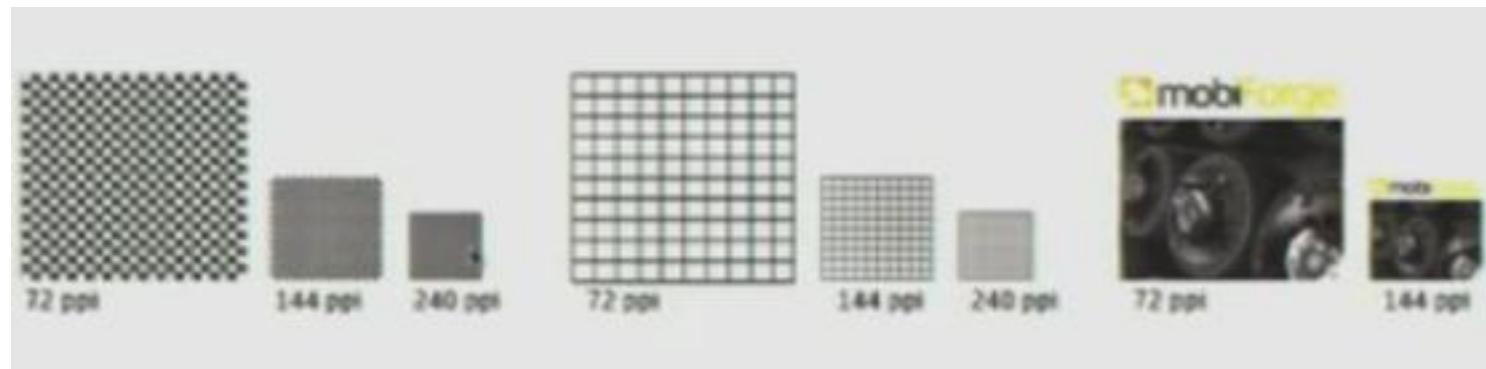
- ▶ Users are expecting a well designed mobile experience



Design for multiple screen sizes

- ▶ Iphone 3G
 - 320x480 3,5in 164ppi
- ▶ Motorolla Droid, Nexus One
 - 480x854 3.7in 264ppi
- ▶ Iphone 4
 - 960x640 3,5in 326ppi

The impact of ppi



The impact of ppi

Cinema Display	1920x1200	24 in	94ppi
Nokia N900	800x480	3.5 in	266ppi

What devices are we targeting?

- ▶ Define device groups
- ▶ Create a default reference design
- ▶ Define rules for content and design adaptation
- ▶ Opt for web standards and flexible layout

Speed



Some tips

- ▶ Keep performance on top of mind
 - Reduce requests and file size
 - Eliminate redirects
 - Use css sprites to serve multiple images
 - Consolidate css and js into a single file
 - Minify your code
- ▶ Take advantage of HTML5
 - Load content lazily
 - Use application cache for local content storage
 - Use css 3 and canvas tag instead of images where possible.

Performance matters



100ms delay results in 1% sales loss



500ms delay drops search traffic by 20%
According to study if you do it consistently over a period of 2 weeks you lose the users permanently.



400ms delay results in 5–9% drop in full page traffic

Context

- ▶ Quick bursts everywhere
- ▶ One handed interactions !!



During a typical day

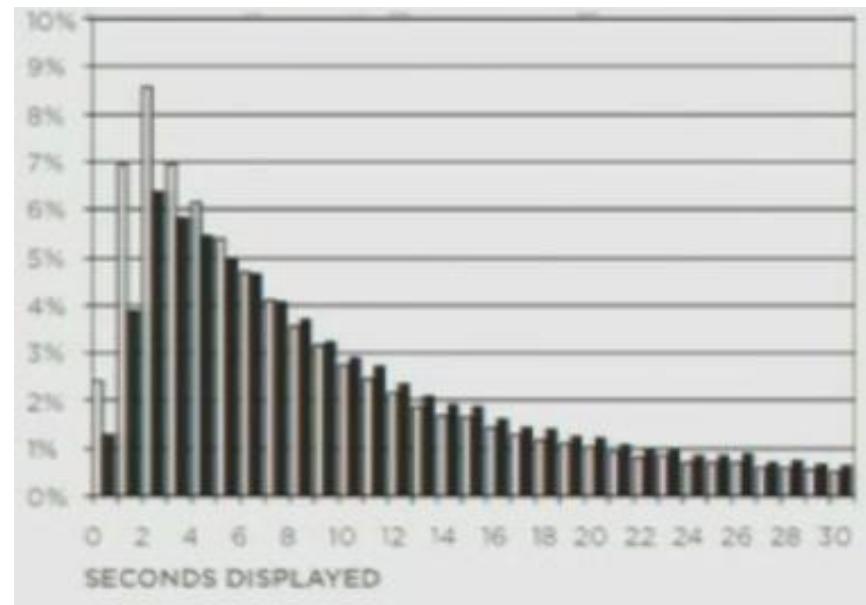
- ▶ 84% at home
- ▶ 80% during misc times throughout the day
- ▶ 74% waiting in lines
- ▶ 64% at work

Use cases for mobile apps

- ▶ Social
 - Facebook, Twitter
- ▶ Entertainment
 - Angry Birds
- ▶ Communication
 - Email, Skype
- ▶ Local
 - Yelp, Maps
- ▶ Information
 - Google search, Wiki
- ▶ Utilities
 - Calendar, Flashlight

Browsing patterns

- ▶ 25% of documents displayed for less than 4s
- ▶ 52% of all visits were shorter than 10s
- ▶ Peak value was located between 2 and 3 sec



One handed interactions

- ▶ Simplify UI
- ▶ Big buttons

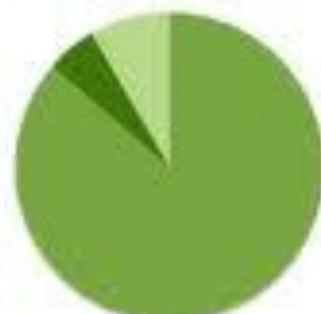
Capabilities = Innovation



Touch

Nokia smartphone mix

Keypad Qwerty Only Touch INCLUDES QWERTY + TOUCH



2008



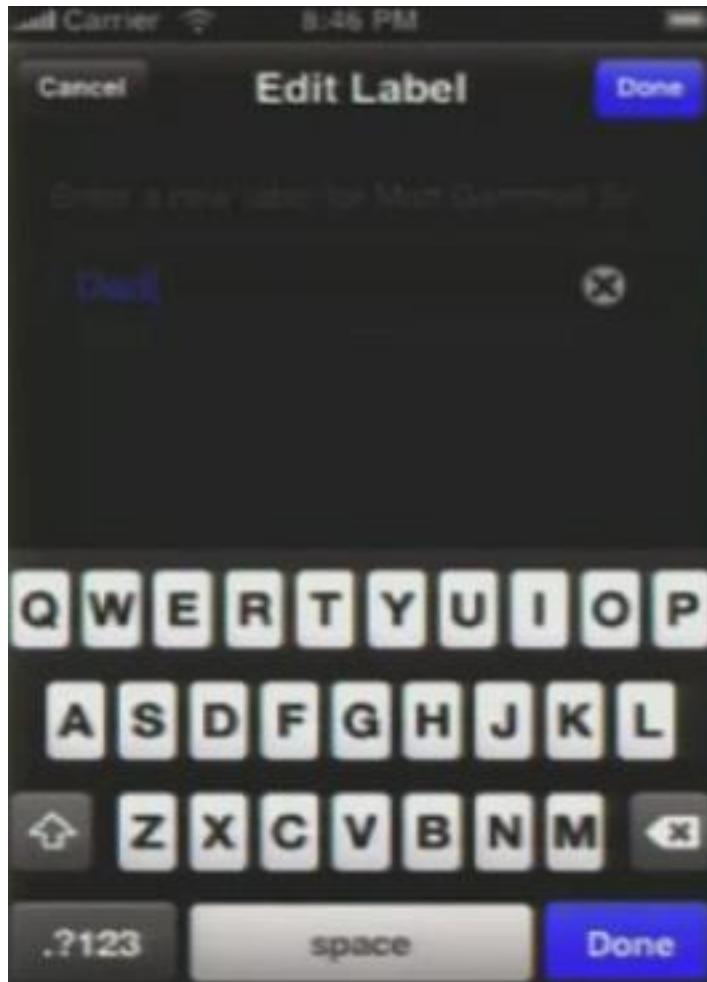
2009



2010
PROJECTED

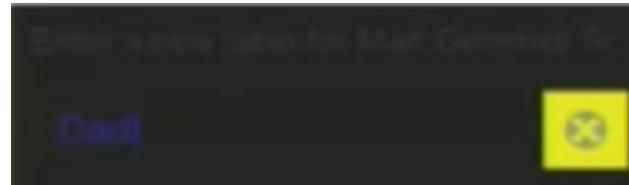
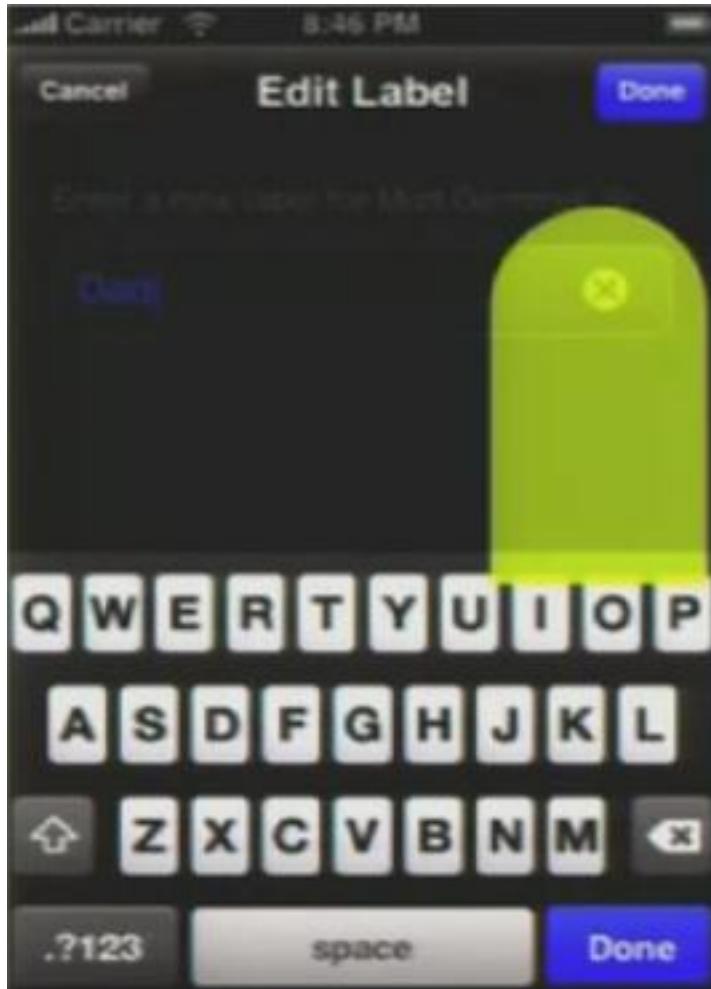
Source: Nokia - Nokia Capital Markets Day 2008

Touch



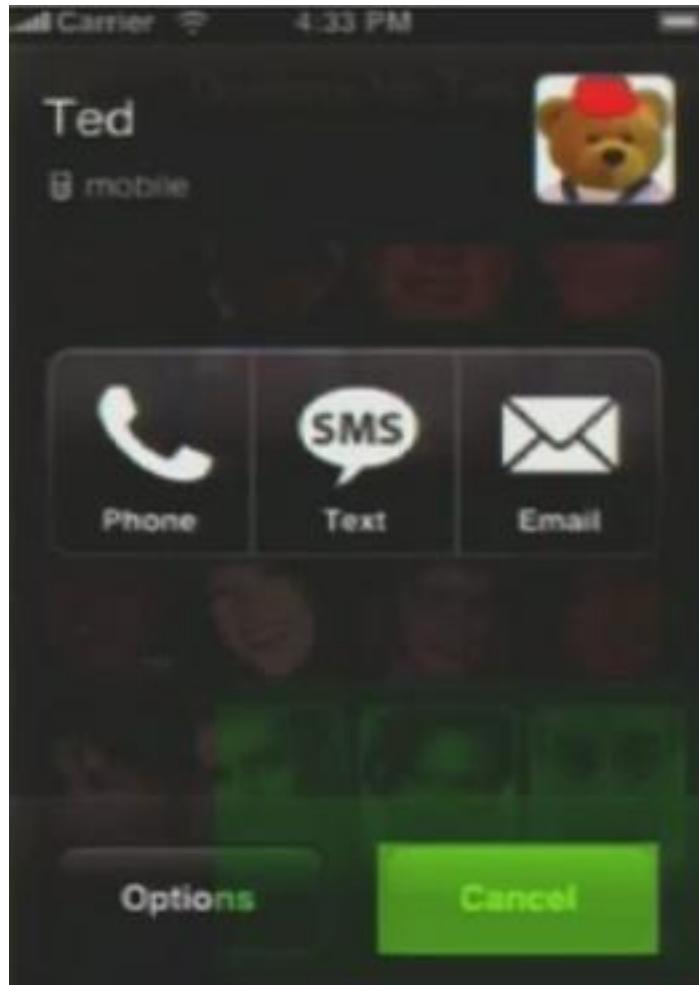
- ▶ Apple recommends a minimum target size
 - 29px wide
 - 44px tall

Touch



- ▶ Apple recommends a minimum target size
 - 29px wide
 - 44px tall

Target sizes for slipping fingers



- ▶ Add room for error

Touch gestures

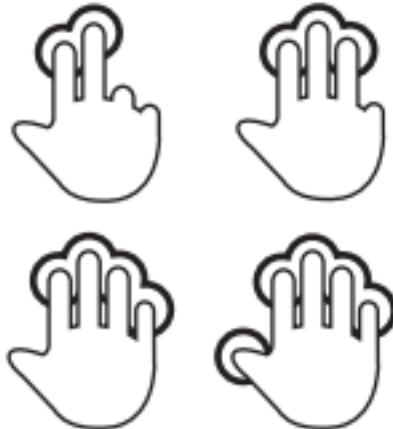
- ▶ Tap (multi)
- ▶ Double tap
- ▶ Drag (multi)
- ▶ Flick
- ▶ Pinch (multi)
- ▶ Spread (multi)
- ▶ Press
- ▶ Press & tap
- ▶ Press & drag
- ▶ Rotate

Tap & Press

Tap



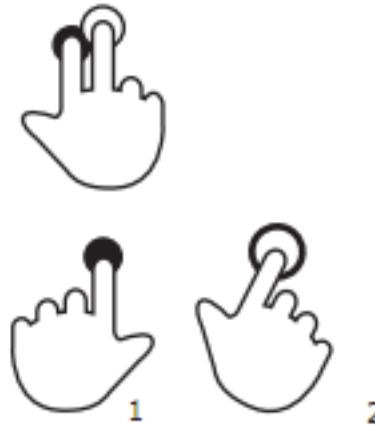
Multi-finger
tap



Press



Press
and tap

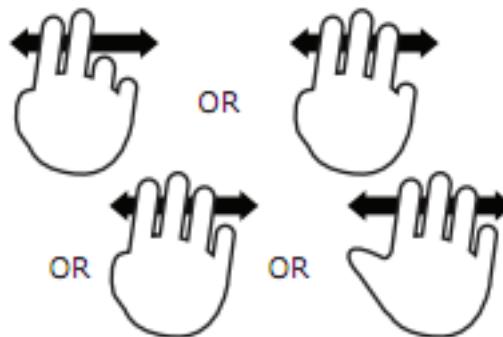


Drag

Drag



Multi-finger
drag



Pinch & spread

Pinch



Squeeze



Spread



Rotate

Rotate



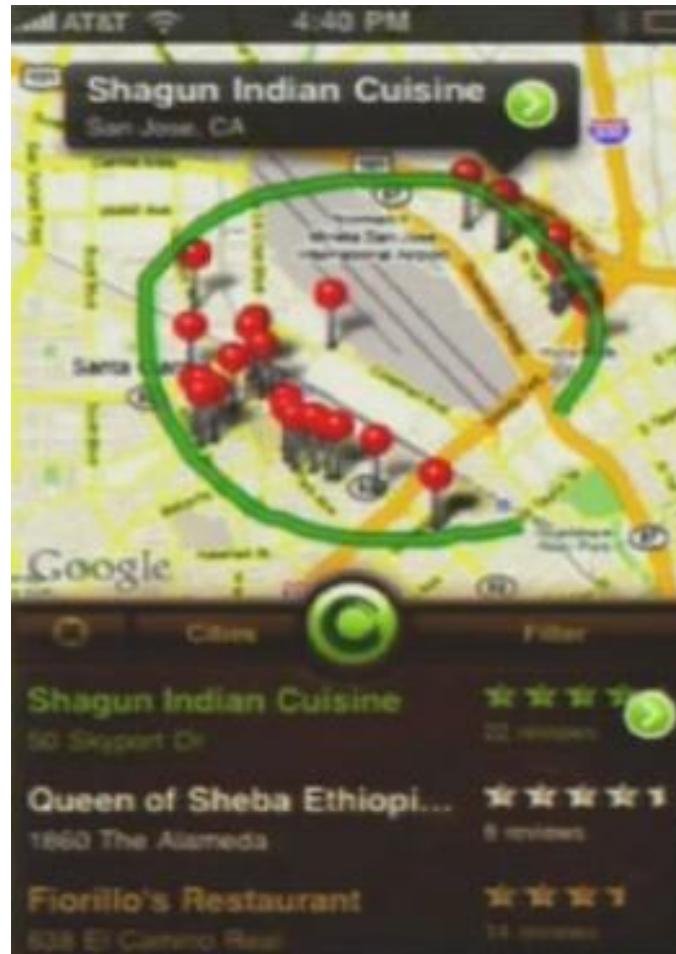
OR



OR



Gestures as input



Comboboxes



Picker controls



No hover

- ▶ Maybe good because of hover overload
 - Hover is not an intentional user action



Location as input

yelp
Real people. Real reviews.®

Search for (e.g. taco, cheap dinner, Max's) Near (Address, Neighborhood, City, State or Zip)
San Francisco, CA Search

Welcome About Me Write a Review Find Reviews Invite Friends Messaging Talk Events Member Search

Yelp San Francisco Other Cities | New York | San Jose | Los Angeles | Chicago | Palo Alto | Oakland | More »

Yelp is the fun and easy way to find and talk about great (and not so great) local businesses [Sign Up Now](#)

Best of Yelp

Restaurants 4462 reviewed

1. Rancho Parnassus
2. Chilotes Grocery
3. Smitten Ice Cream
4. Deli Board
5. Gary Danko
[...see more »](#)

Nightlife 1210 reviewed

1. Red Hots Burlesque
2. Viracocha
3. Brava Theater Center
4. 9:20 Special
5. SFJAZZ
[...see more »](#)

Shopping 6969 reviewed

1. 7 SUN 12-5 edgewearts
AMING
4 (VALLEJO) SF CA 94110 41
EDGEWISE arts
"g"
AMING
4 (VALLEJO) SF CA 94110 41

1. Edgewise Arts
2. Jon Casey...
3. Michael Bruno...
4. Chabo's Jewelry
5. Just Bands
[...see more »](#)

Beauty and Spas 3021 reviewed

1. Cyclops Tattoo
2. Alisha Valverde,...
3. Lyle Tuttle...
4. Aesthetics by...
5. Lucky Van's Tattoo
[...see more »](#)

Browse by Category

- Professional Services 8487
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 - Local Services 3002
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 - Arts & Entertainment 2166
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Get the Yelp app on your mobile phone

It's free and helps you find great, local businesses on the go!

[Get it for Free Now](#)

Yelp Deals Deal ends in 22:17:55

\$50 for \$100 Worth of Jewelry
Mabel Chong 20 reviews
Reg. Price Discount Savings
\$100 50% \$50 [See the Deal](#)

Review of the Day [Archive »](#)

Voted by our members!

Yu Zen
4.5
Vivian H.
Lately, it seems as if Japanese food is all I like to eat. I really wanted to try traditional Japanese food at Kappou Gomi, but then I started to crave for fresh, raw fish. Off to Yu Zen! Of... [Read more »](#)

Location as input



Geo location methods

- ▶ GPS
 - Best quality
 - High battery consumption
- ▶ Wifi
 - 100m accuracy
- ▶ Cell tower triangulation
 - Minimal battery consumption
 - Good for most cases
- ▶ IP address
 - Only good on a country level. Maybe city.

Context aware computing

- ▶ Being in a place provides context
 - What can you infer now ?
- ▶ Throw time in the mix
 - How about now?

Mobile Device Capabilities

- ▶ Application cache for local storage
- ▶ CSS 3 & Canvas for performance optimization
- ▶ Multitouch sensors
- ▶ Location detection

- ▶ Device positioning & motion: Accelerometers
- ▶ Orientation: Digital compass
- ▶ Audio: Microphone
- ▶ Video & Image: Camera
- ▶ Push real-time notifications
- ▶ Peer to Peer connections: Bluetooth or WiFi
- ▶ Ambient light: light/dark environment awareness
- ▶ RFID reader: identify & track objects with broadcasted identifiers
- ▶ Haptic feedback: feel different surfaces on a screen
- ▶ Biometrics: retinal, fingerprints, etc.

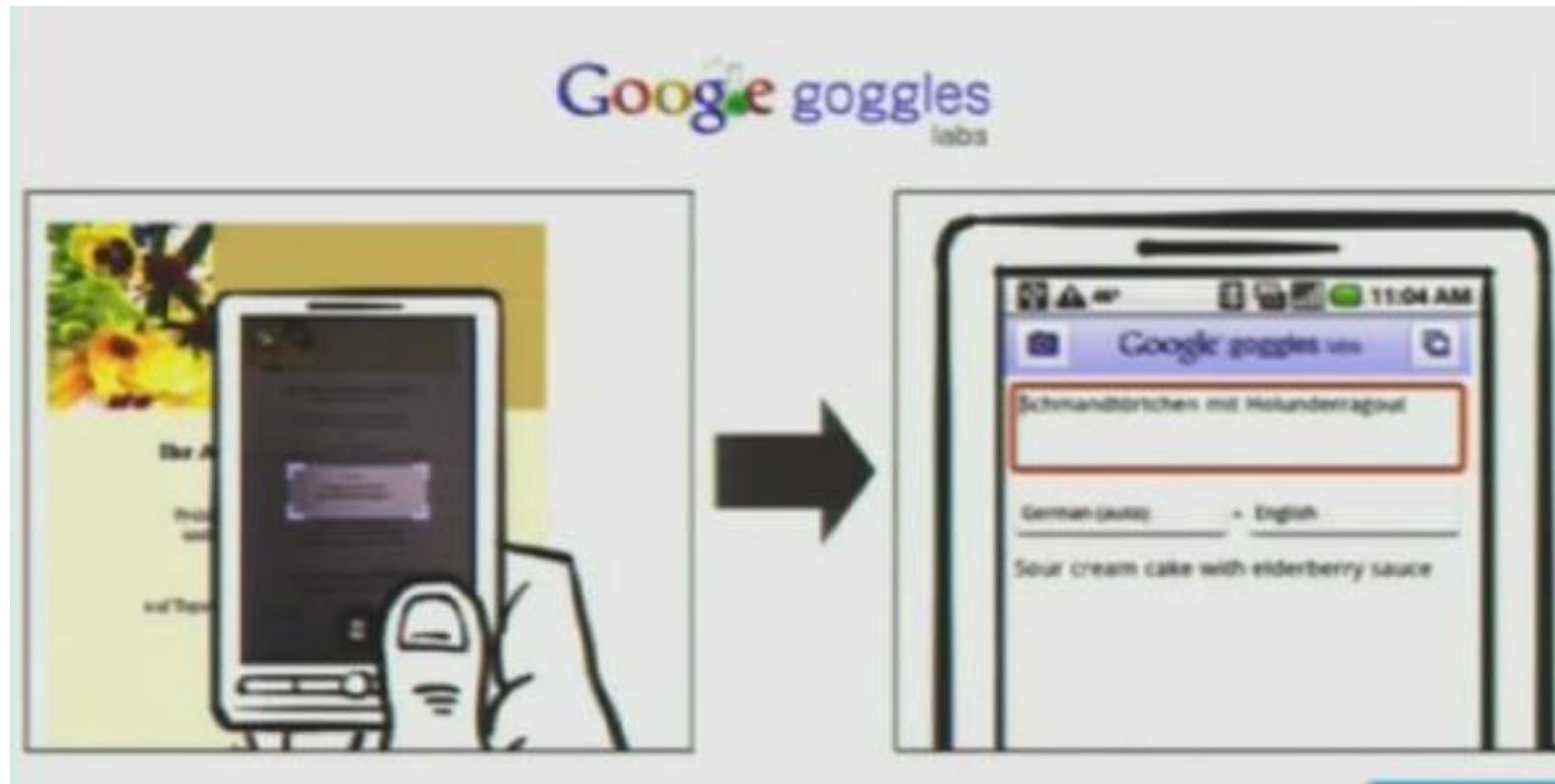
Multiple orientation



Location and Orientation as input



Images as input



So what are my options?

- ▶ Native
 - Objective C, Java Android
- ▶ Web
 - HTML5,CSS3, Javascript
- ▶ Hybrid?
 - PhoneGap, Titanium, Rhodes

Iphone vs Android



Iphone vs Android



Dive into technical stuff

- ▶ What is AJAX ?
- ▶ How to make asynchronous Web requests ?
- ▶ Using jQTouch to set up touch events.
- ▶ Animations with jQTouch.

jQuery recap

- ▶ `$("#hello"); // id:hello`
- ▶ `$(".hello"); // class:hello`
- ▶ `$("div"); // all divs`
- ▶ `$("div", "#main"); // all divs inside main`
- ▶ `$("div").each(function(){
 $(this).doSomething();
}); // act on every div`
- ▶ `$("#hello").css("background-color", "black");`

Network & Javascript



Topics

- ▶ GET vs POST
- ▶ Asynchronous vs Synchronous
- ▶ XML vs JSON

Basics: GET & POST

- ▶ **GET** `http://example.com/index.html?hello=yes&goodbye=no`
 - No message body
 - Query is in the URL
 - Shouldn't change data on server

- ▶ **POST** `http://example.com/index.php`
 - Message body has parameters
 - Can have side-effects, change data on server
 - Can carry more data
 - This is an *action*

In other words...

- ▶ *fetch using GET*
- ▶ *change using POST*

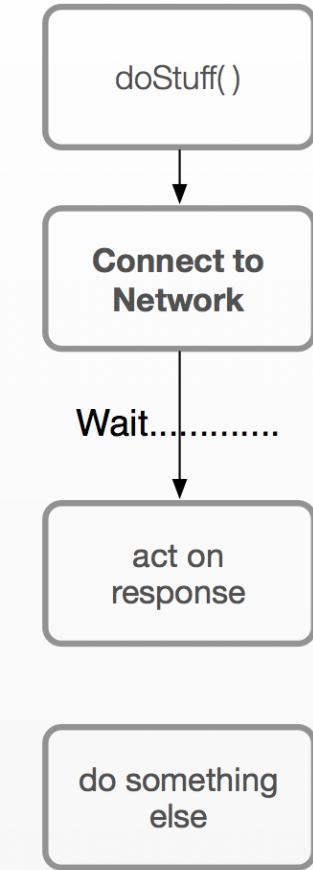
AJAX

**Asynchronous
Javascript
And
XML**

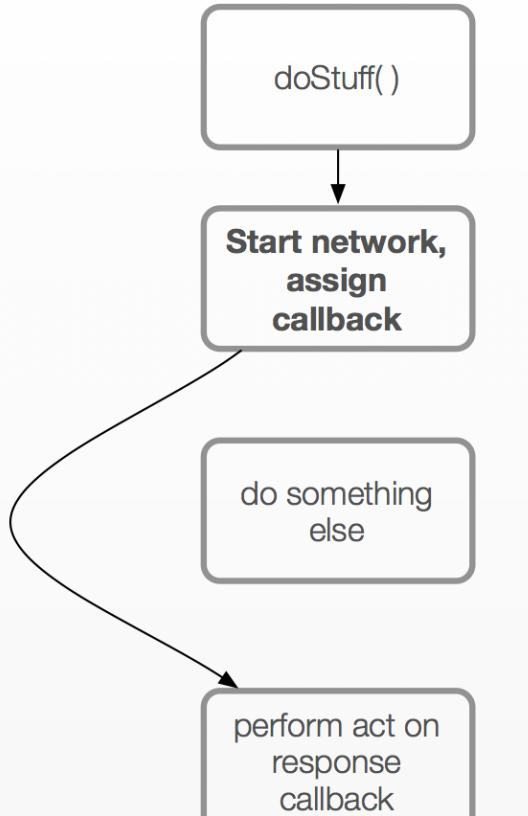
What does asynchronous mean?

- ▶ In context of network connections: let other stuff happen while a network request is going on

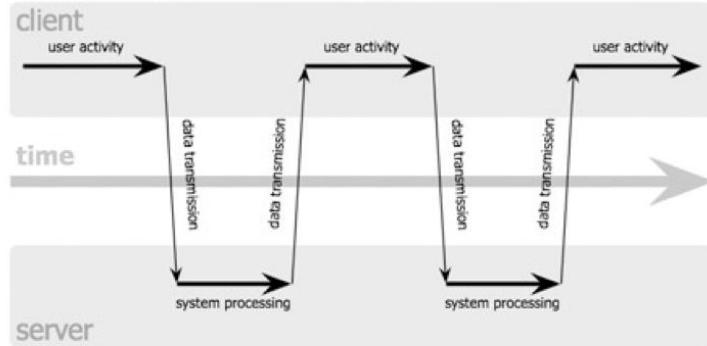
Synchronous



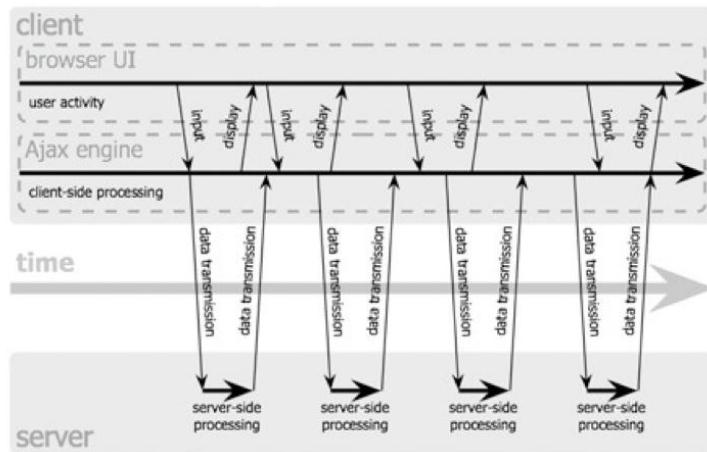
Asynchronous



classic web application model (synchronous)



Ajax web application model (asynchronous)



XML?

- ▶ Many people use JSON instead of XML
 - easier to build/parse than XML

What is JSON?

- ▶ **JavaScript Object Notation**
 - Takes the array, object, and string notation from JS & makes it a transport format (can send around a string that evaluates to JSON)

Sample JSON

```
{  
    classes: [  
        {"name": "SAE",  
         "location": "Amph 1"},  
        {"name": "Diktia",  
         "location": "Aith 2"}  
    ]}
```

Sample JSON

```
{  
  classes: [  
    {"name": "SAE",  
     "location": "Amph 1"},  
    {"name": "Diktia",  
     "location": "Aith 2"}]  
} // this is an object with an array inside that  
  contains two objects
```

JSON.parse()

- ▶ Takes JSON data, encoded in a string
- ▶ Returns an object you can use in JS

Example

```
>> var a = "[5,4,3,2,1,\"hello\"]"  
>> var b = JSON.parse(a);  
>> a.length  
6  
>> a[5]  
"hello"
```

JSON.stringify

- ▶ Takes a Javascript Array, Object, or String, and turns it into JSON

Example

```
var a = {"dog":"bark", "cat":"meow"};
```

```
>> JSON.stringify(a);
```

```
"{\\"dog\\":\\"bark\\", \\"cat\\":\\"meow\\"}"
```

Asynchronous Requests in jQuery

- ▶ overall function: `.ajax()`
 - Shortcuts: `.get`, `.post`, `.getJSON`

\$.ajax

```
var options = {  
    data: {  
        "animals": ["dog", "cat", "cow"]  
    },  
    dataType: "json",  
    error: onError,  
    success: successFn,  
    url: "/postAnimal.php"  
};
```

```
$.ajax(options);
```

Success & Failure

```
response: {'dog':'bark', 'cat':'meow', 'cow':'moo'}
```

```
function onSuccess(data) {  
    $.each(data, function(i, item) {  
        $("<div>" + i + " says " + item + "</div>")  
            .appendTo("#animals");  
    })  
}
```

```
function onError(function(request, settings) {  
    $("#status").append("<div>Error fetching " +  
        settings.url + "</div>")  
})
```

Shortcuts

```
$.get(url, data, successCallback);  
// no error callback  
// grabs HTML or XML
```

```
$.getJSON(url, data, successCallback);  
// also no error callback  
// but grabs & parses JSON
```

A simple form

```
<form id="mainform" method="POST" action="server.php">
  <td>Your name</td>
  <td>
    <input type="text" name="name"/>
  </td>
  <td>E-mail</td>
  <td>
    <input type="text" name="email"/>
  </td>
  <td colspan="2">
    <input type="submit" value="send form"/>
  </td>
</form>
```

Form submission in \$

```
$("#mainform").submit(function(event){  
    var keyvals = {};  
    $("input[type!=submit]",  
    "#mainform").each(function(i,el){  
        el = $(el);  
        keyvals[el.attr("name")] = el.val();  
    })  
  
    $.post($(this).attr("action"), keyvals, function(response){  
        $("#response").html(response);  
    })  
    return false; //prevents normal submit event from firing  
})
```

jQTouch

- ▶ jQTouch Basics & Workflow
- ▶ Changing list input style
- ▶ Overriding styles
- ▶ Setting up animations
- ▶ Swipes & Touches

jQTouch

- ▶ Include it after jQuery gets loaded
- ▶ There's also a “jQuery Touch”, that's a different project

jQTouch Basics

```
<head>
  <style type="text/css" media="screen">@import "../jqt/jqtouch.css";</style>
  <style type="text/css" media="screen">@import "../jqt/theme.css";</style>
  <script src="../jquery.js" type="text/javascript" charset="utf-8"></script>
  <script src="../jqt/jqtouch.js" type="text/javascript" charset="utf-
  8"><script>
    <script type="text/javascript" charset="utf-8">
      var jQT = new $.jQTouch();
    </script>
</head>
```

jQTouch HTML

```
<div id="example" class="current">
  <ul class="rounded">
    <li><a href="#one">Page 1</a>
    <li><a href="#two">Page 2</a>
  </ul>
</div>
<div id="one">
  <div class="toolbar">
    <h1>Page 1</h1>
    <a class="back">Back</a>
  </div>This is page one.
</div>
<div id="two">
  <ul>
    <li>This is another page. <a href="#two">go to page 1?</a></li>
  </ul>
</div>
```

Workflow

- ▶ Add divs to your page with meaningful IDs
- ▶ Set up links to those ids with anchors inside LIs:
 - your link</ a>
- ▶ jQTouch handles the animations
- ▶ target=_blank on external links

Content can be fetched asynchronously

- ▶ Just specify a URL instead of a hash

Loading asynch

```
<div id="example" class="current">
  <ul class="rounded">
    <li><a href="#one">Page 1</a>
    <li><a href="jqtouch-loadme.html">Page
      2</a>
    </ul>
  </div>
<div id="one">This is page one. </div>
```

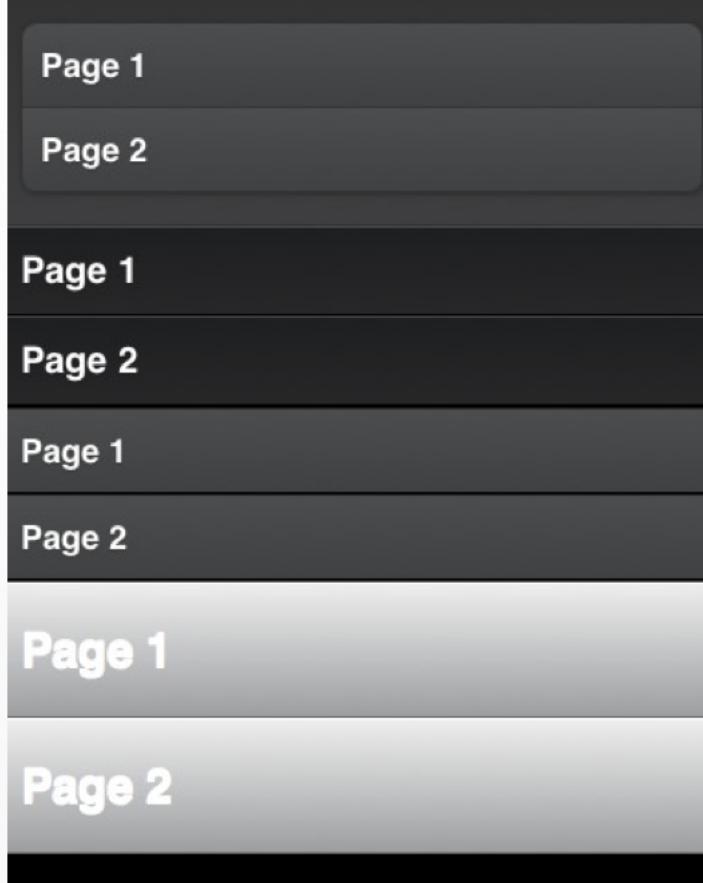
Configuring webapp

```
var jQT = new $.jQTouch({  
    statusBar: 'black',  
    icon: 'cs.png',  
    addGlossToIcon: true, // defaults to true  
    startUpScreen: 'my-start.png'  
});
```

Specifying list type

- ▶ Change class of
- ▶ Default theme options: rounded, edgetoedge, plastic, metal

List types



Rounded

edgetoedge

plastic

metal

Customization

- ▶ Include basic jqtouch.css
- ▶ Optionally include theme.css
- ▶ Add your own styles by overwriting
- ▶ Use Web Browser tools to check what styles are active

Specifying animation

- ▶ Specify class on your <a> link

Available Animations

- ▶ slide
- ▶ slideup
- ▶ dissolve
- ▶ fade
- ▶ flippop
- ▶ swap
- ▶ cube

Example

```
<div id="example">
  <ul class="rounded">
    <li><a class="flip" href="#one">Page 1</a>
    <li><a class="swap" href="#two">Page 2</a>
  </ul>
</div>
```

Detecting Touches

- ▶ jQuery will set an “active” class on touch&hover for anything with a ".touch" class
- ▶ Will take off the active class if the touch ends up not being a tap (if you move your finger)
- ▶ And if you swipe sideways, will fire .swipe

Source

```
<script type="text/javascript" charset="utf-8">
var jQT = new $.jQTouch({});
$(document).ready(function(){
    $(".touch").swipe(function(){
        alert("SWIPE");
    })
    $(".touch").bind("touchstart", function(){
        $(".touch").unselect();
    })
})
</script>...

<div id="example">
    <div class="touch cta">Touch this.</div>
    <div class="touch cta">Or touch that.</div>
</div>
```

Geolocation API

- ▶ `navigator.geolocation.getCurrentPosition(callback)`

Sample code

```
navigator.geolocation.getCurrentPosition(handlePosition)
```

```
function handlePosition(position) {  
    $("#lat").html(position.coords.latitude);  
    $("#lon").html(position.coords.longitude);  
}
```

Getting orientation change

```
// event name: orientationchange  
// using jQuery:  
  
$("body").bind("orientationchange", function(event) {  
    react()  
})
```

Source

```
function setOrientation() {  
    var orientation = (window.innerWidth < window.innerHeight) ?  
        'portrait' : 'landscape';  
    $("#orientation").html(orientation);  
}  
  
$(document).ready(function(){  
    setOrientation();  
    $("body").bind("orientationchange", function(event){  
        setOrientation();  
    })  
})
```

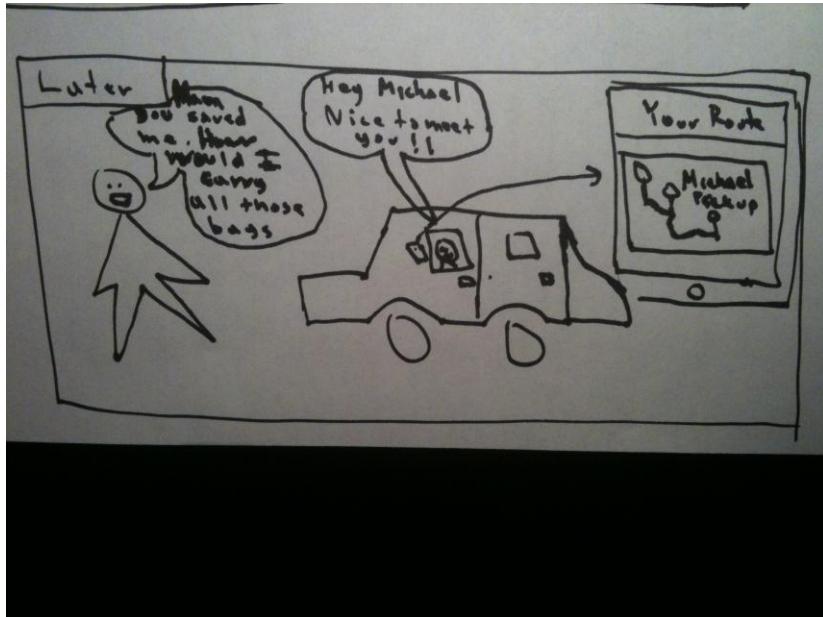
Design Tools



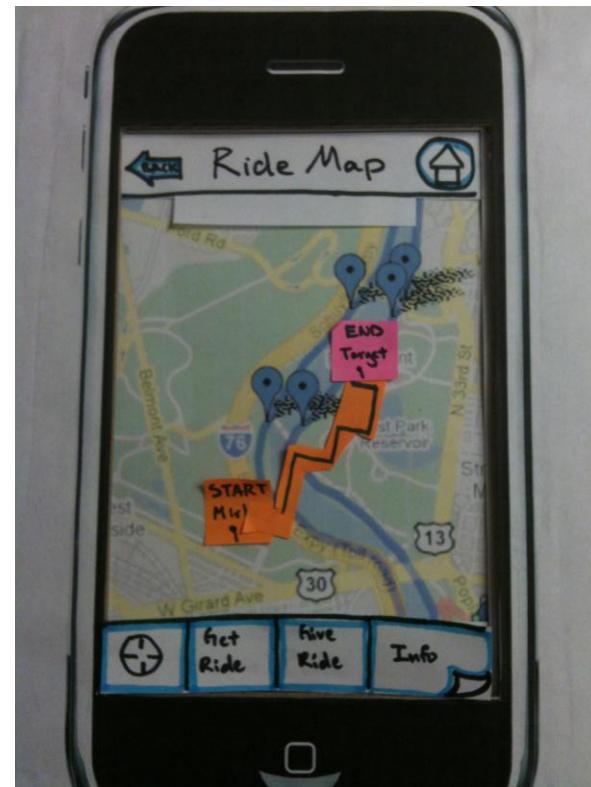
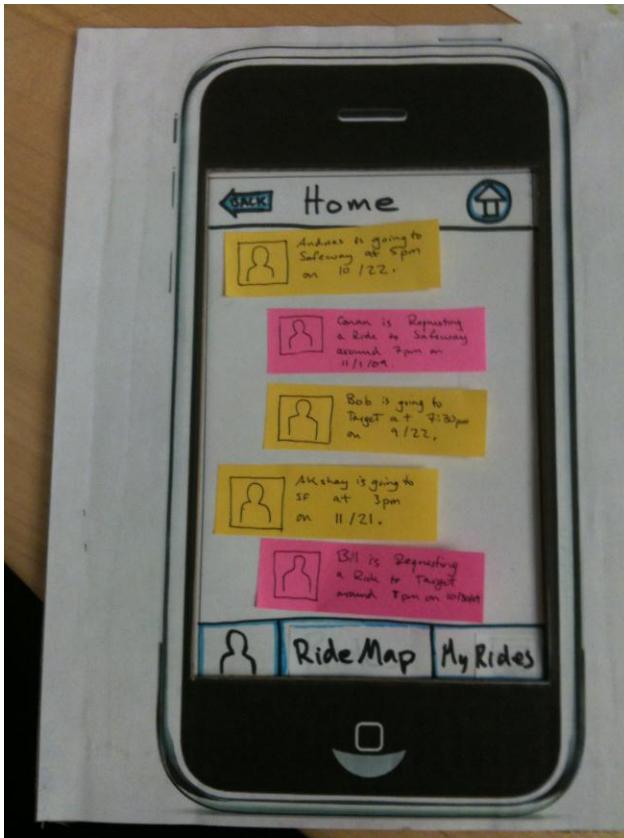
NeedFinding

- ▶ Brainstorming
 - Go for quantity in the beginning not quality
- ▶ Do your homework
 - Check references to learn from previous attempts in the same area
- ▶ Follow users
 - Yes I mean stalk them

Story boarding



Paper prototyping



Video Prototyping



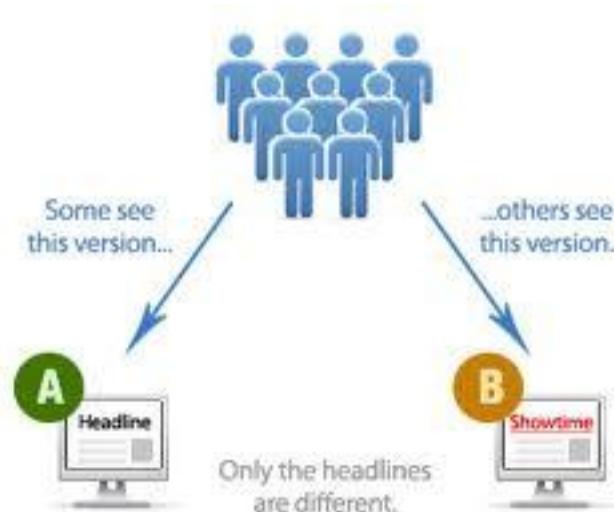
Functional Prototyping

- ▶ **HTML Mockups**
 - Create a minimal design that will allow you to test user flows
- ▶ **Minimum Viable Product (MVP)**
 - Launch a product with the minimum features and iterate

Evaluation



- ▶ A/B Testing is king
 - Metrics, metrics, metrics



- ▶ Gather user feedback

Questions?

