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

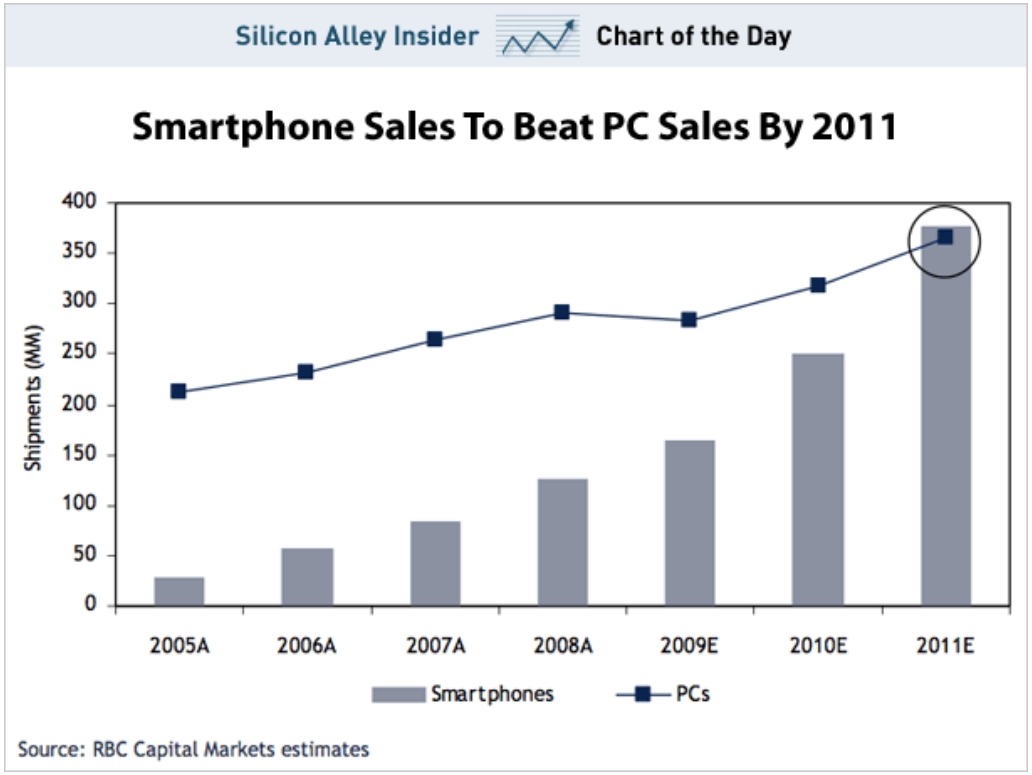
Growth = Opportunity

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

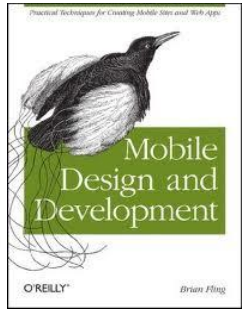
- Screen size
  - Focus on core actions
  - Know your users
  - Use scalable design

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

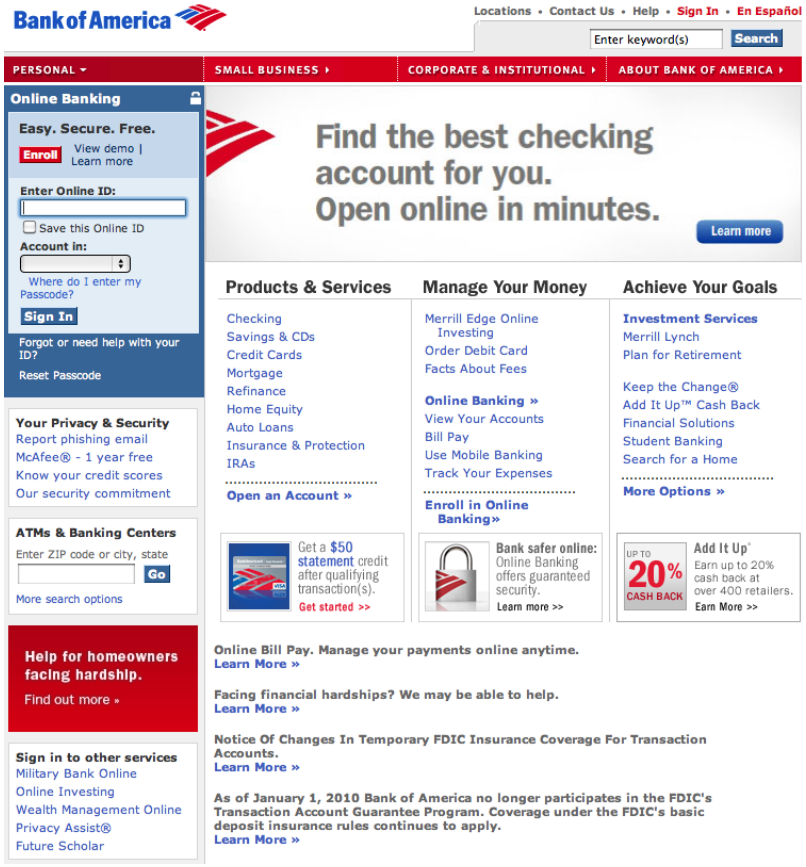
Focus on core actions

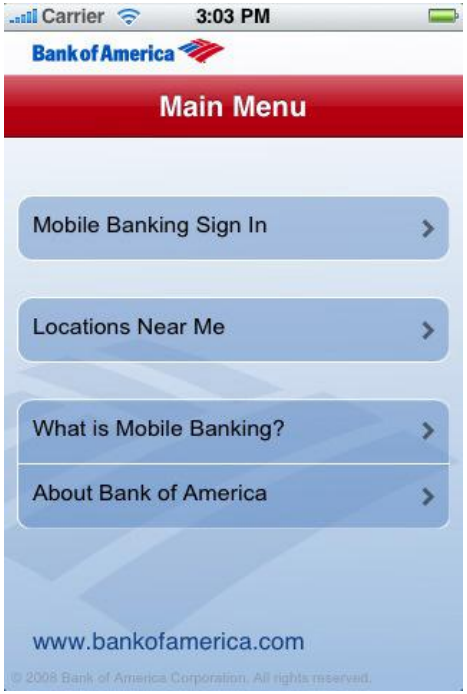
- The main function should be immediately apparent !!

Focus on core actions

Focus on core actions

Focus on core actions





Focus on core actions

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

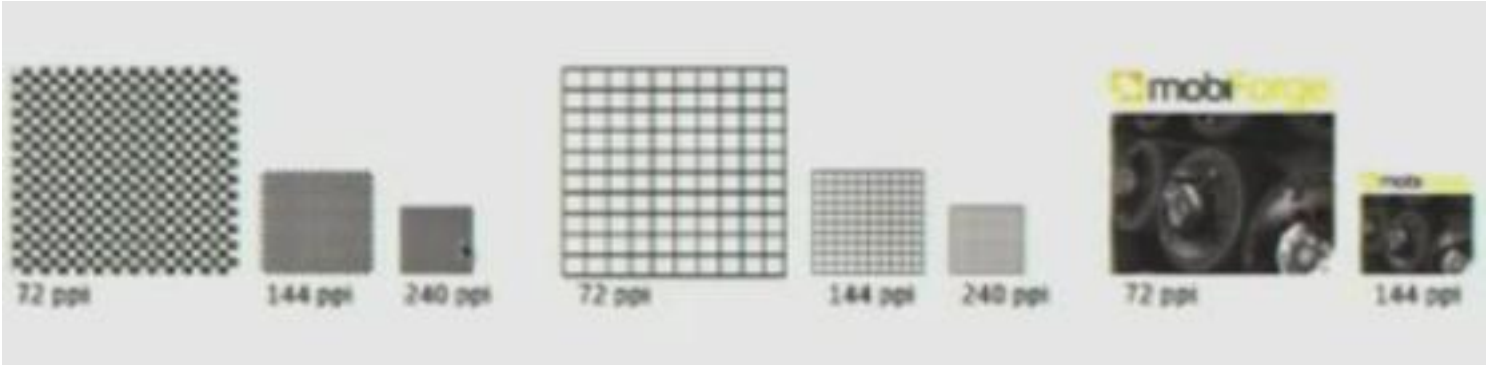
App design matters!

- Users are expecting a well designed mobile experience

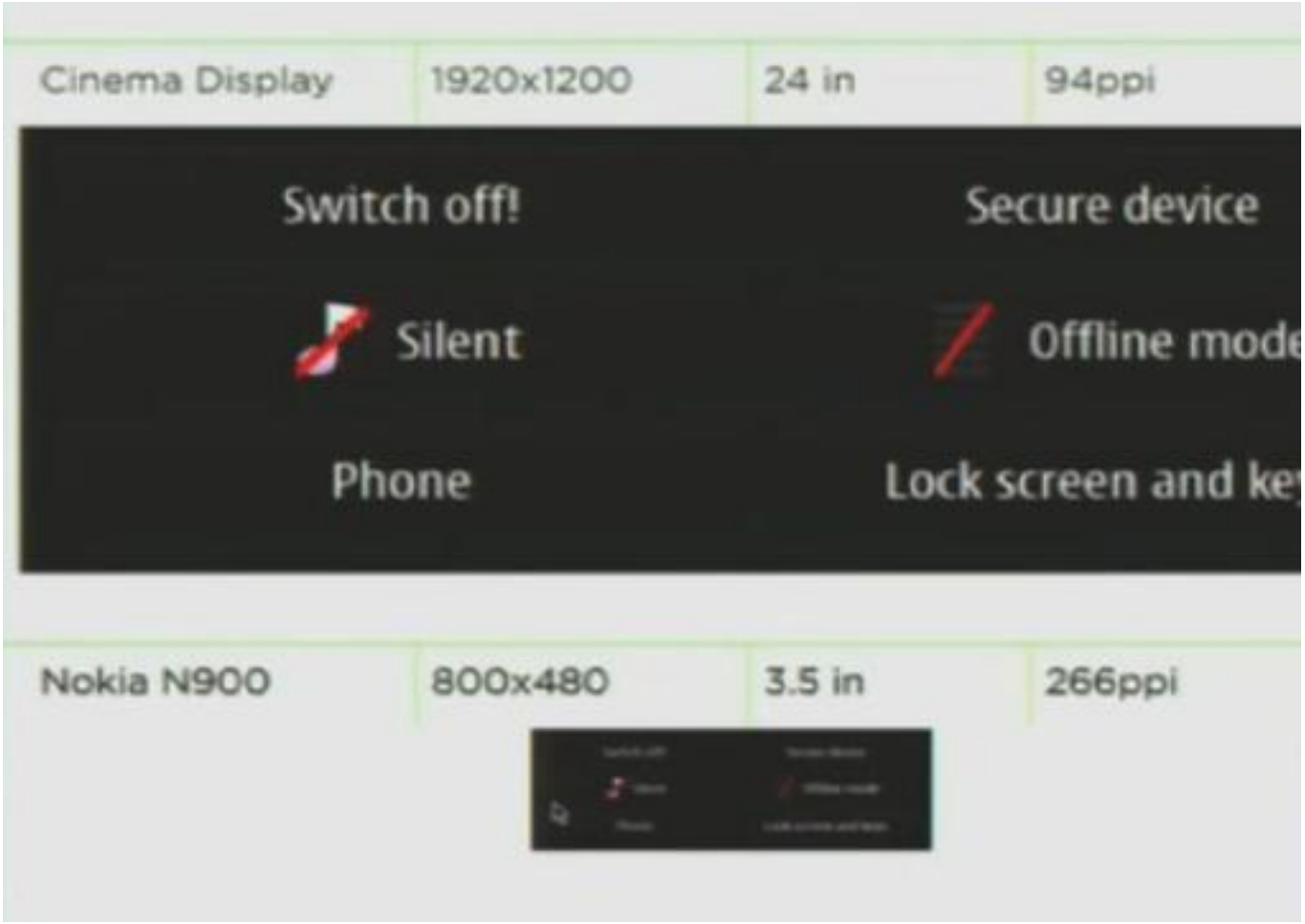
Design for multiple screen sizes

- 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



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

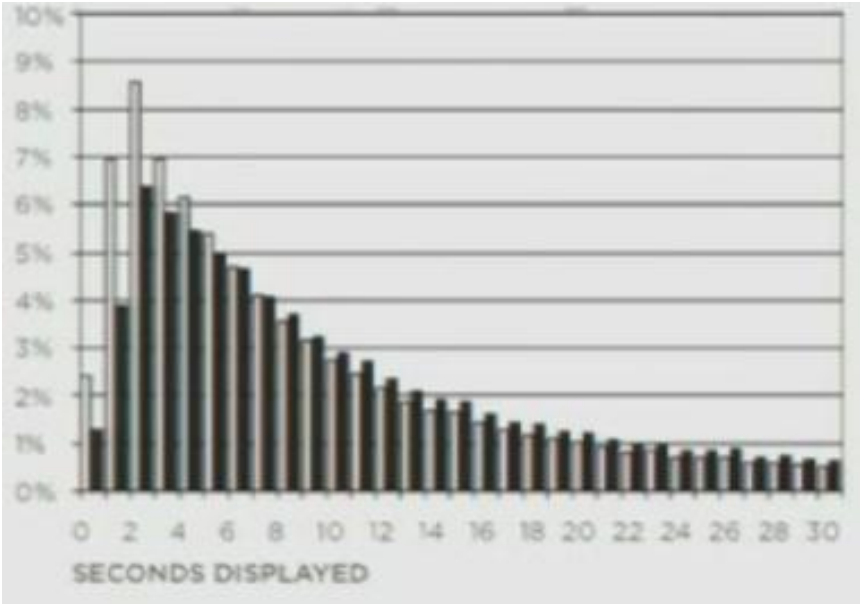
- 84% at home
- 80% during misc times throughout the day
- 74% waiting in lines
- 64% at work

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

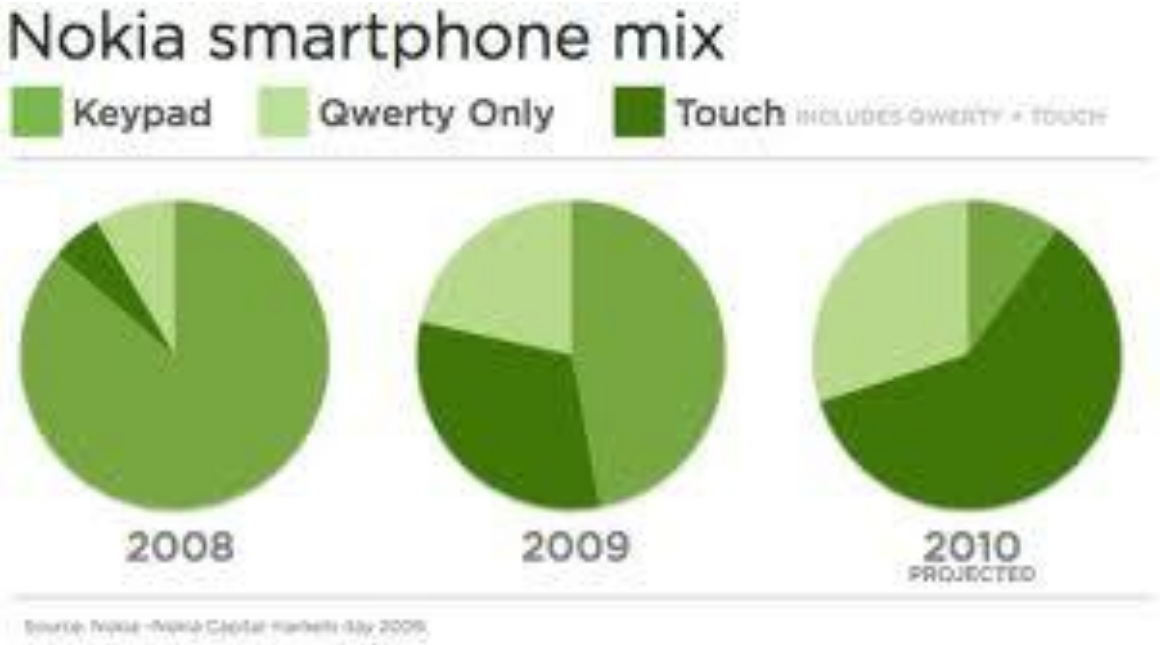


One handed interactions

- Simplify UI
- Big buttons

Capabilities = Innovation

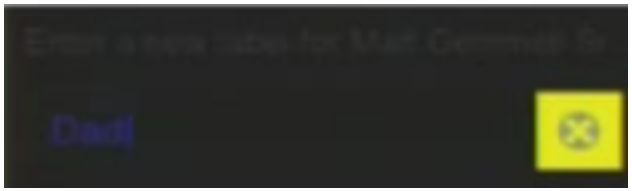
Touch


Nokia smartphone mix
Keypad
Qwerty Only
Touch
2008
2009
2010
PROJECTED

Touch

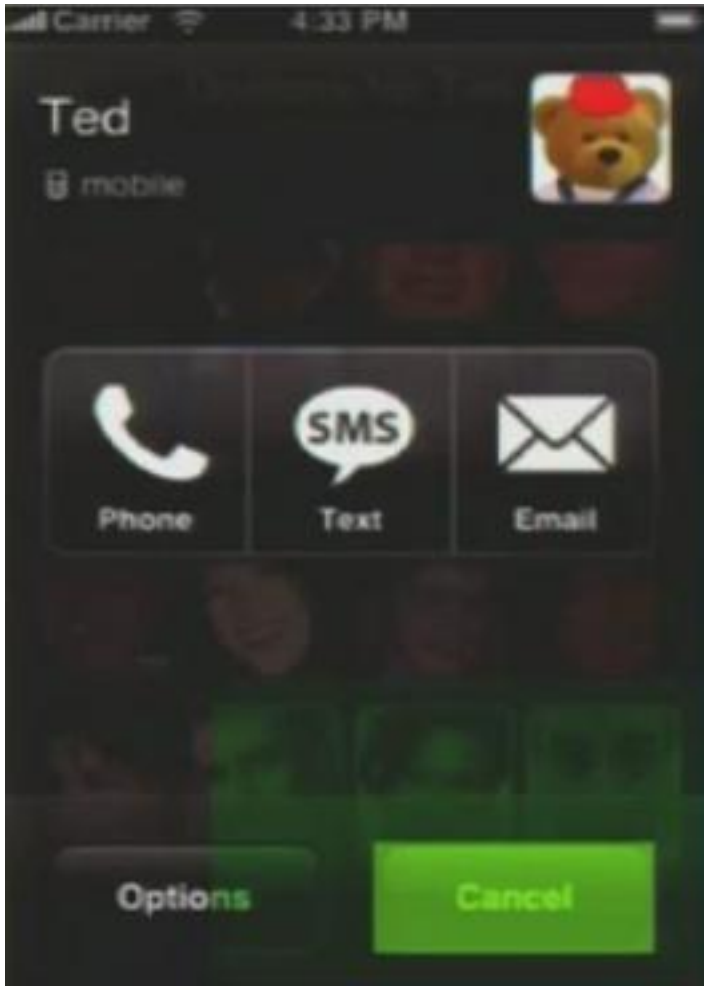
- Apple recommends a minimum target size
  - 29px wide
  - 44px tall

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

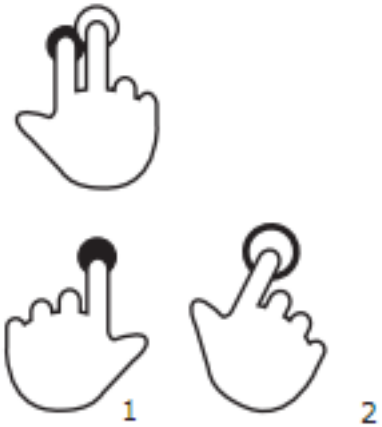
Tap & Press

Tap

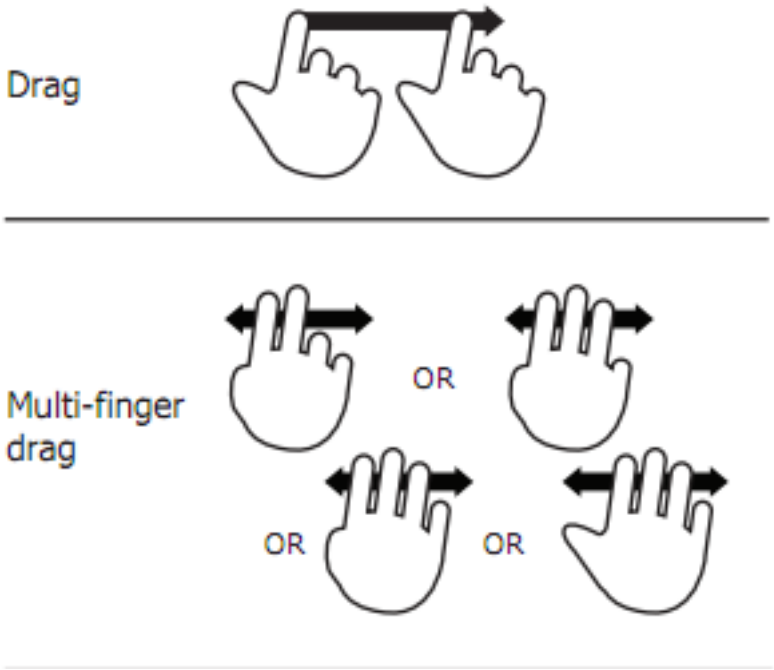
Press

Multi-finger tap

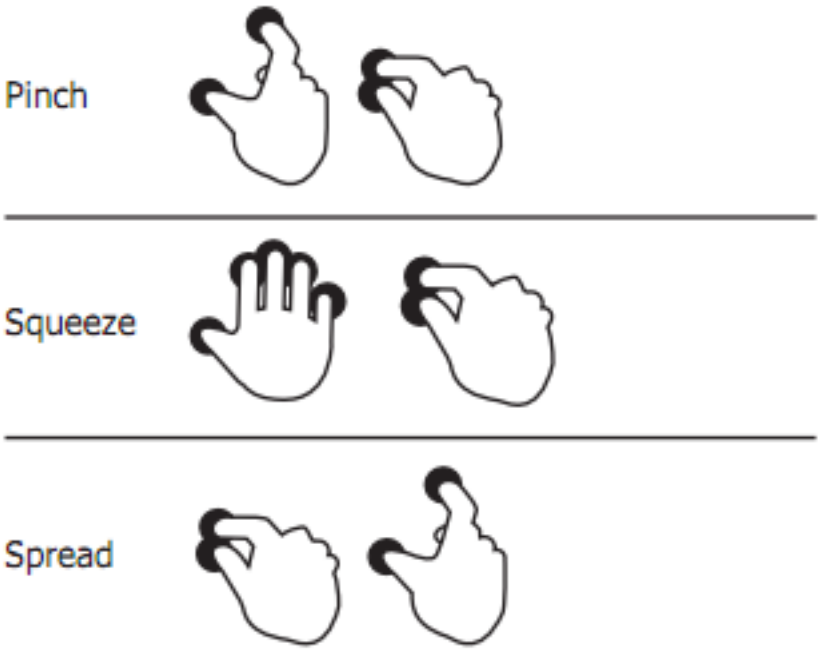
Press and tap



Drag



Pinch & spread



Rotate

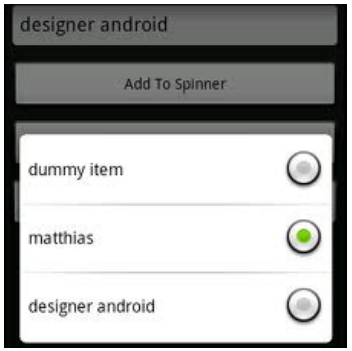
Rotate

Gestures as input

Comboboxes


XTipComboBoxTest
Fruits:
watermelon
Cities:
Boston, Massachus
Atlanta, Georgia
Austin, Texas
Boston, Massachusetts
Butte, North Dakota
Chicago, Illinois
Dallas, Texas
Denver, Colorado
Flagstaff, Arizona
Idaho Falls, Idaho
Lake Providence, Louisiana
Los Angeles, California
Madison, Wisconsin
Medford, Oregon
Miami, Florida
New York, New York
Saint Paul, Minnesota
Taos, New Mexico
Three Forks, Montana
Topeka, Kansas


Carrier
10:65 AM
Number:
INC00052
Category:
Software
Priority:
1 - Critical
Incident state:
Previous
Next
Done
Request
Inquiry / Help
Software
Hardware
Network


designer android
Add To Spinner
dummy item
matthias
designer android

Picker controls

No hover

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

Location as input

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

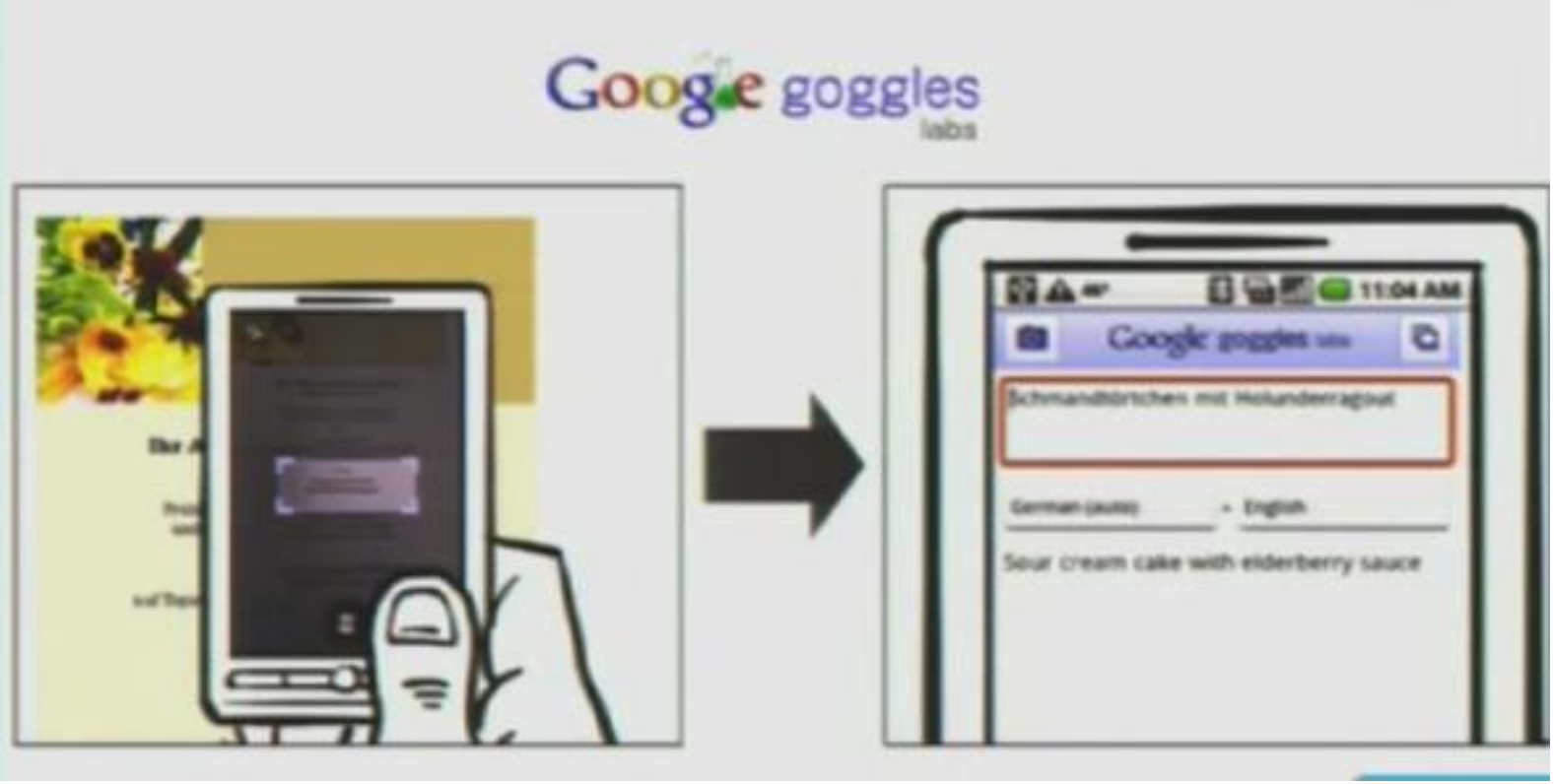
- Application cache for local storage
- CSS 3 & Canvas for performance optimization
- Multitouch sensors
- Location detection

- 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...

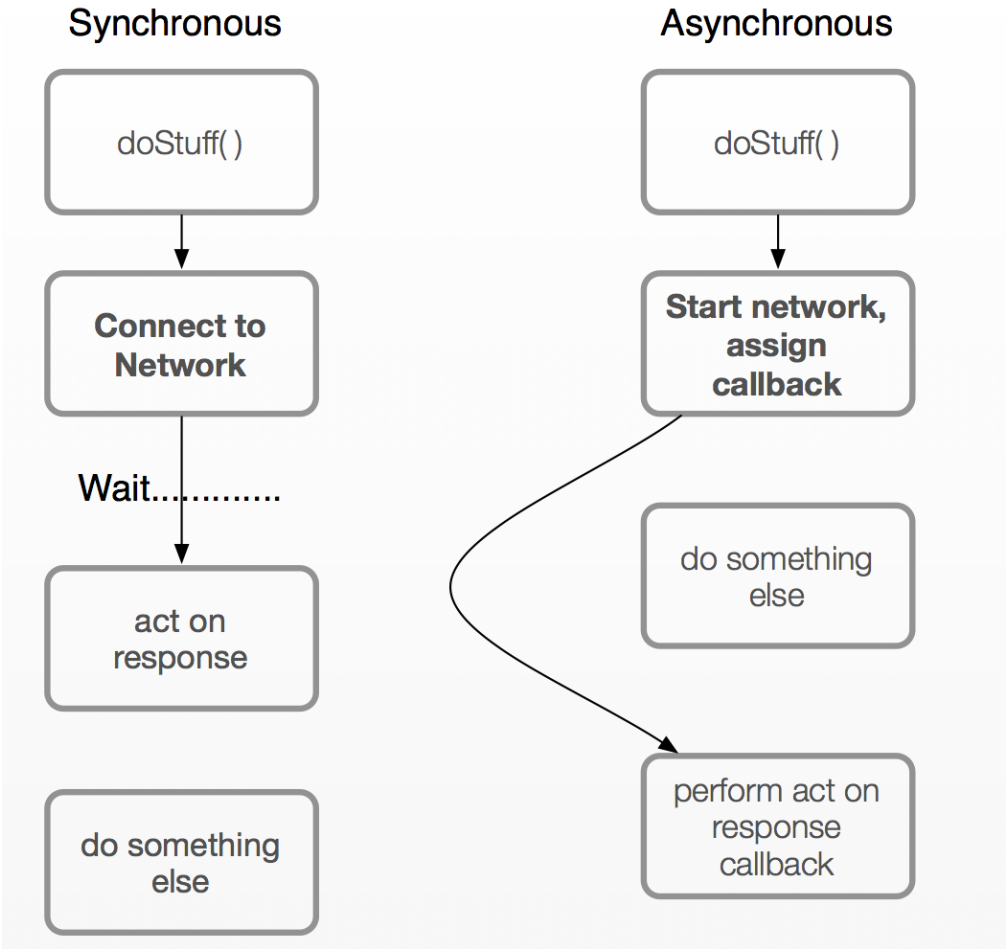
- *fetch using GET*
- *change using POST*

AJAX

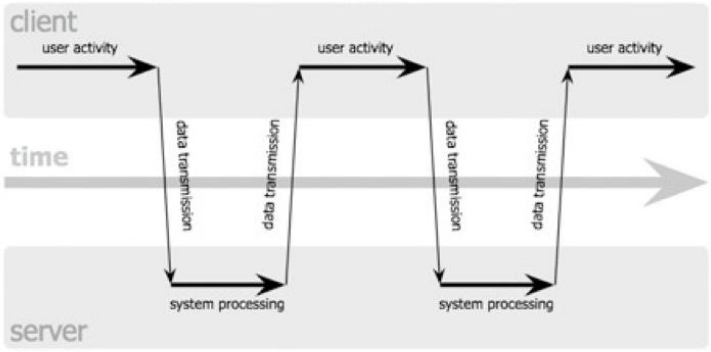
Asynchronous
Javascript
And
XML

What does asynchronous mean?

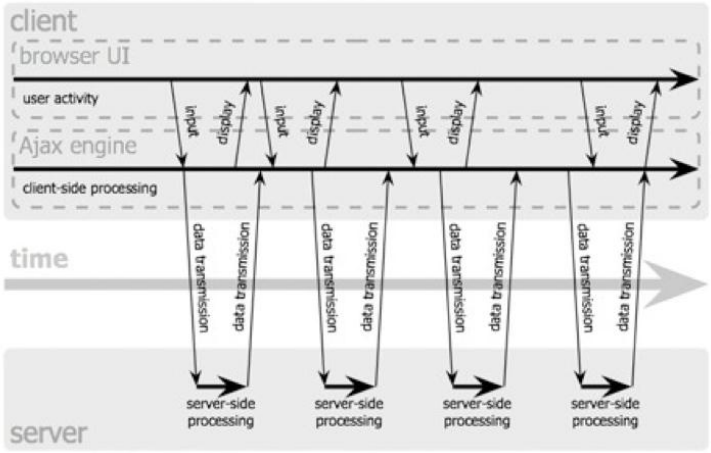
- In context of network connections: let other stuff happen while a network request is going on


Synchronous
doStuff( )
Connect to Network
Wait.....
act on response
do something else
Asynchronous
doStuff( )
Start network, assign callback
do something else
perform act on response callback

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": "Ampth 1”
     },{
     "name":"Diktia",
     "location": ”Aith 2”
     }
   ]}
```

Sample JSON

```
{
   classes: [{
     "name":”SAE",
     "location": ”Ampth 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:
  - <a href="#yourid">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>
```

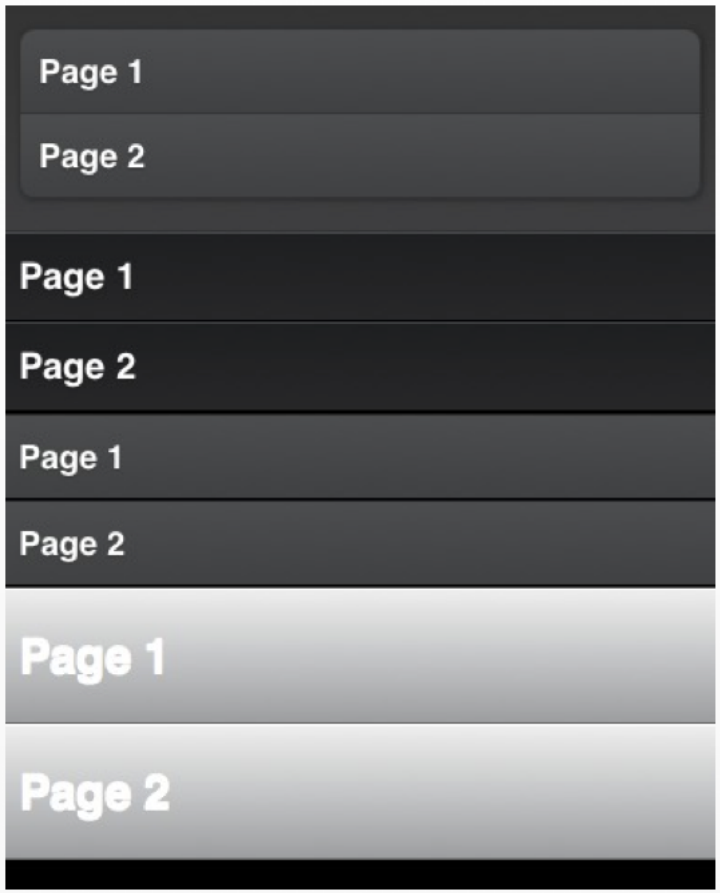
Configuring webapp

```
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

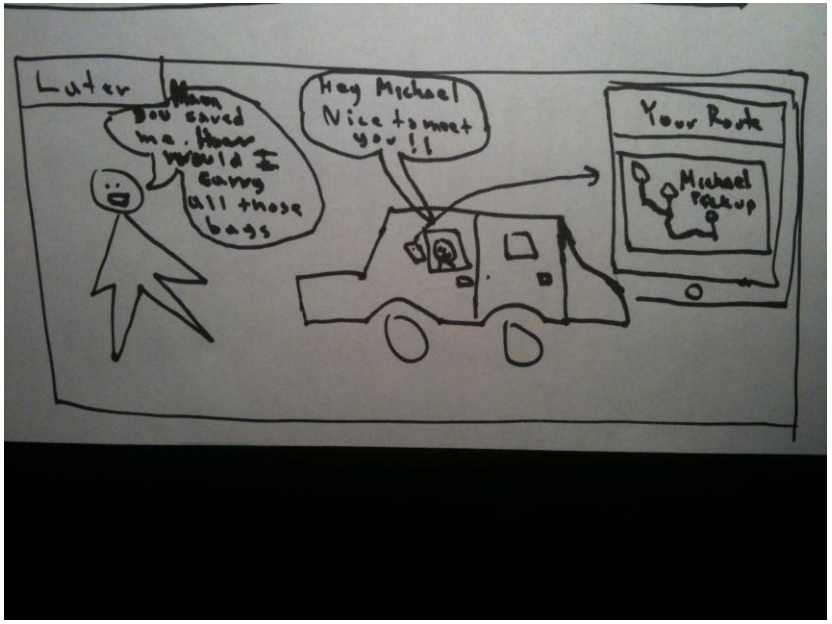
```
function setOrientation() {
    var orientation = (window.innerWidth < window.innerHeight) ?
    'portrait' : 'landscape';
    $("#orientation").html(orientation);
}

$(document).ready(function(){
    setOrientation();
    $("body").bind("orientationchange", function(event){
            setOrientation();
    }
})
```

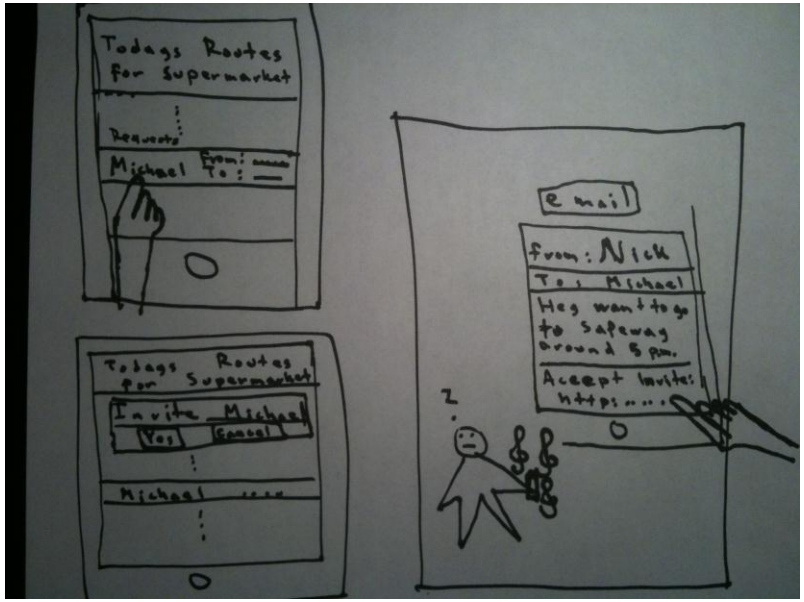
Design Tools

NeedFinding

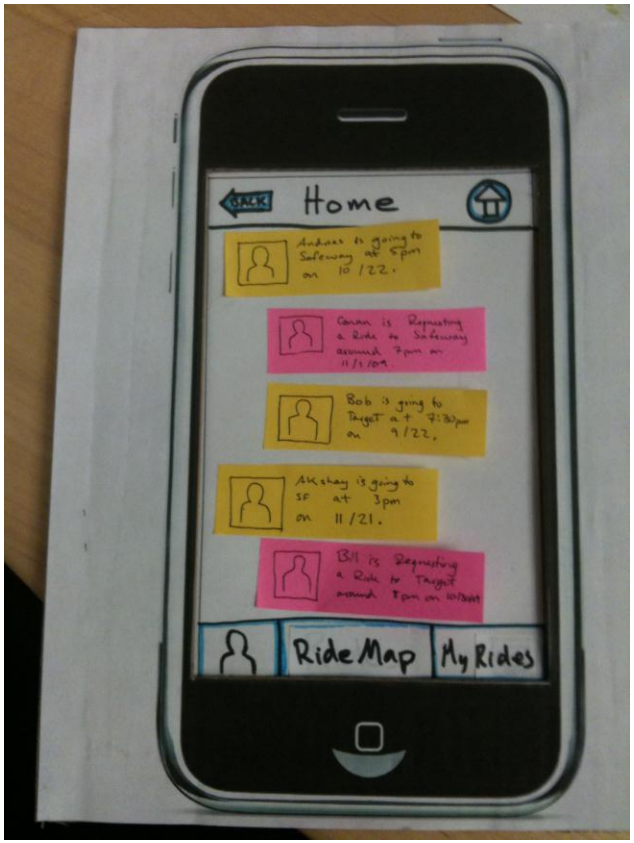
- Brainstorming
  - Go for quantity in the beginning not quality
- Do your homework
  - Check references to learn from previous attempts in the same area
- Follow users
  - Yes I mean stalk them

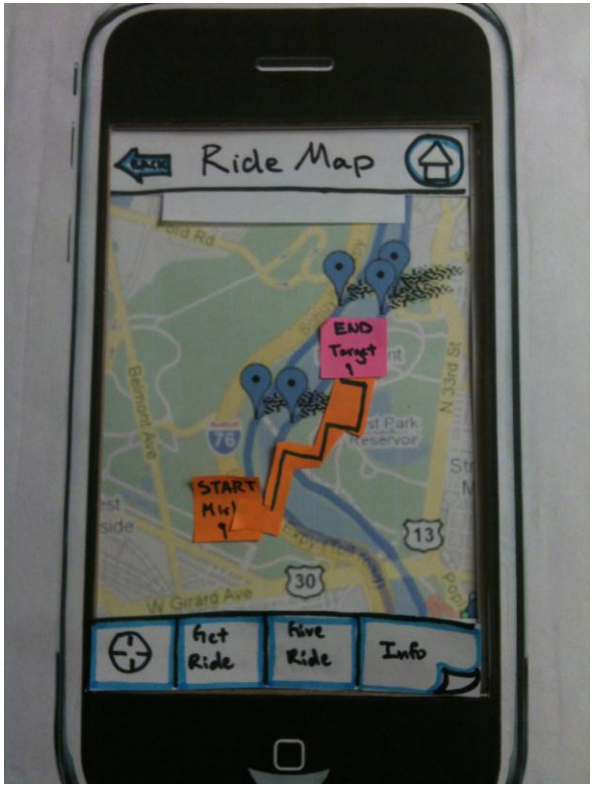
Story boarding





Paper prototyping





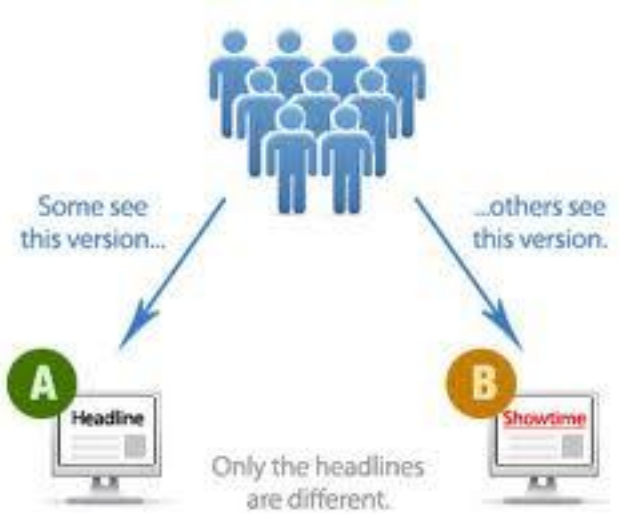
Video Prototyping

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?