

Mobile Development with uPortal & Infusion

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Who is Fluid?

<http://fluidproject.org>

- Is an Open Source community of
 - Designers
 - Developers
 - Accessibility Experts
- Helps other open communities
- Consists of universities, museums, and individuals



What is Fluid Infusion?

- Application Framework built on top of jQuery
- Lightweight CSS Framework (FSS)
- UI Components you can reuse and adapt
- Open architecture: everything is configurable
- Designed for Usability and Accessibility



Going Mobile



Big Question:

What platforms should we support?



Everything?

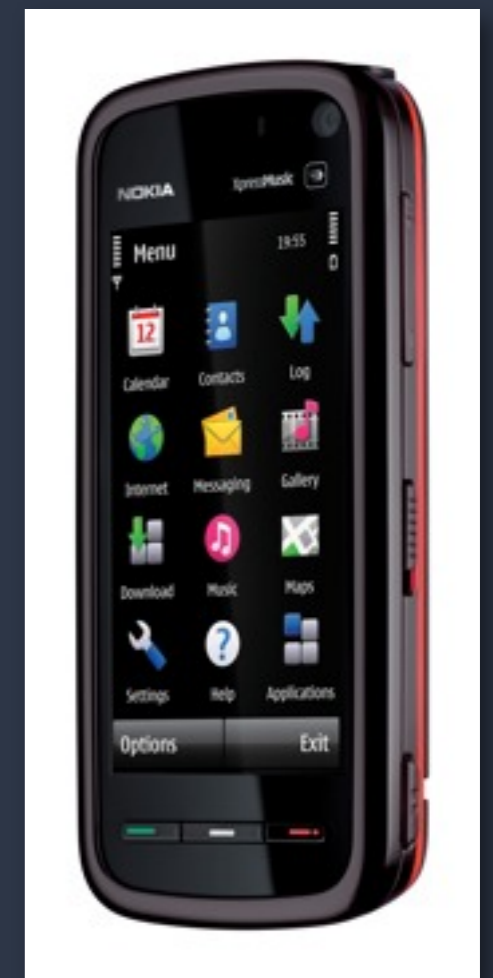


Everything?

Objective-C

Java

C++



Cocoa Touch

Android SDK

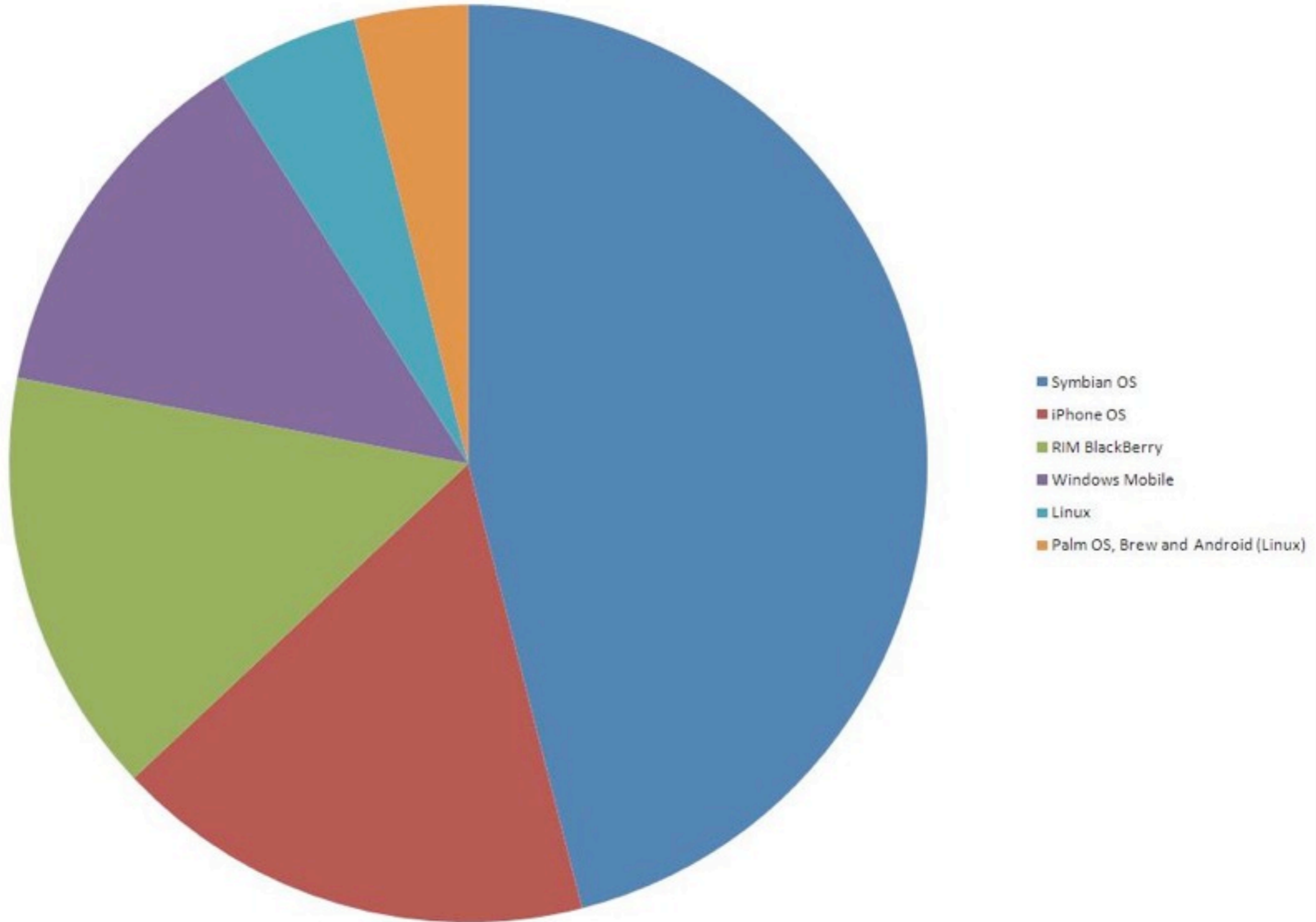
Carbide



Only One?



Only One?



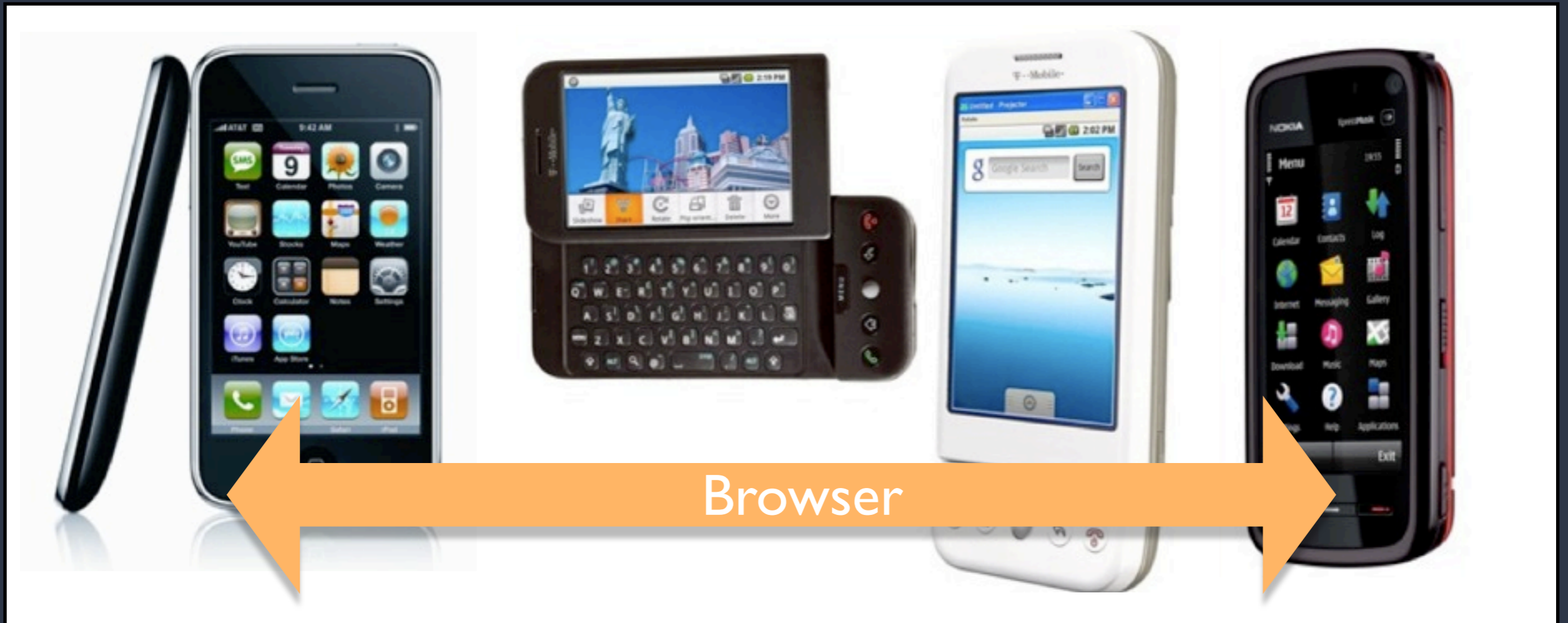
Mobile: Embrace the Web

- Phones now have *great* browsers built in
- Web design is ubiquitous and familiar
- Use standard HTML, CSS, and JavaScript
- Blends seamless into existing sites
- Thin native apps provide access to interactive features (camera, bluetooth)



Mobile Web apps

HTML, CSS, JS



The Open Web Today

- Multi-touch gestures
- Audio and video
- Vector graphics and animation
- Great accessibility
- All work on mobile today!
- Stable and deeply interoperable
- Everyone knows it

A Growing Approach



Google Latitude



Mobile Web Pain Points

- Sparse documentation
- Few successful Open Source examples
- Existing frameworks have limitations

Sparse Documentation

Availability

Available in Safari 3.0 and later.

Available in iPhone OS 1.0 and later.

Support Level

Under development.

-webkit-background-origin

Determines where the background-position property is anchored.

Syntax

```
-webkit-background-origin: origin
```

Parameters

origin

The origin of the background position.

Discussion

The background position can be anchored at the upper-left corner of the border, the upper-left corner of the content, or the upper-left corner of the content inside the padding area.

Availability

Available in Safari 3.0 and later.

Available in iPhone OS 1.0 and later.

Support Level

Experimental CSS 3.

Existing Frameworks

jQTouch iUI WebApp.Net Magic Framework

- Reusability of content?
- JavaScript Footprint?
- Flexibility of themes?



Hybrid Apps

- Most platforms have support for embedding browsers in native apps
- Can render user interfaces with HTML
- Write all your code in JavaScript
- Access native hardware with a bridge



PhoneGap

	IPHONE	ANDROID	BLACKBERRY
GEO LOCATION	✓ yes	✓ yes	✓ yes
VIBRATION	✓ yes	✓ yes	✓ yes
ACCELEROMETER	✓ yes	✓ yes	pending
SOUND	✓ yes	✓ yes	✓ yes
CONTACT SUPPORT	✓ yes	pending	✓ yes



infusion



Migrating to Mobile

- Great mobile apps are carefully designed
- The transition to mobile takes time
- Incremental: reuse as much as possible
- Re-skin, re-style, and adapt existing UIs



How Infusion Can Help

- Loose coupling *DOM Agnosticism*
- Unobtrusive and template-driven
- Fast and flexible styling with FSS



DOM Agnosticism

Component code is maximally unaware of the details of the markup layout that it operates on.



DOM Binder

Relaxes the relationship between code and markup



DOM Binder

- Uses named selectors
 - Explicit selectors never appear in code
 - Code is free of baked dependences on markup
- Attached to a component with call to `fluid.initView`



DOM Binder

configuration

```
fluid.defaults("fliquor.imageView", {  
  selectors: {  
    searchButton: ".flc-fliquor-searchButton",  
    searchBox: ".flc-fliquor-search",  
    template: ".flc-fliquor-template",  
    images: ".flc-fliquor-images",  
  }  
});
```



usage

```
that.locate("searchBox").fluid("activatable", that.search);
```

```
that.locate("searchButton").click(function (evt) {  
  that.search();  
  return false;  
});
```



Unobtrusive Templates

- Components render using pure HTML templates
- Code shouldn't break if the markup changes
- Code is not in markup, markup is not in code



HTML Template

```
<body class="flc-fliqor fl-theme-coal">
  <div class="fl-centered fl-navbar fl-table search-bar">
    ...
  <div class="fl-centered results">
    <ol class="flc-fliqor-images fl-list-menu fl-list-thumbnails fl-thumbnails-expanded">
      <li class="flc-fliqor-template">
        <a href="#">
          <span class="wrapper">
            <span class="flc-fliqor-item-title fl-fliqor-item-title">Title</span>
            
          </span>
        </a>
      </li>
    </ol>
  </div>
  ...
</body>
```


Infusion Templates

- Fully customizable
- As semantic as possible
- Advanced accessibility added via JavaScript
- Presentation class names separated from Javascript selector names



Rapid CSS using FSS

- Modular, extensible class-name CSS system
- Easy to read class names
- Plays nice with other CSS systems (jQuery themes, other frameworks, etc)
- Modularity means it's meant for you to hack
- Lots of support, fully cross browser



FSS Applied

Reset

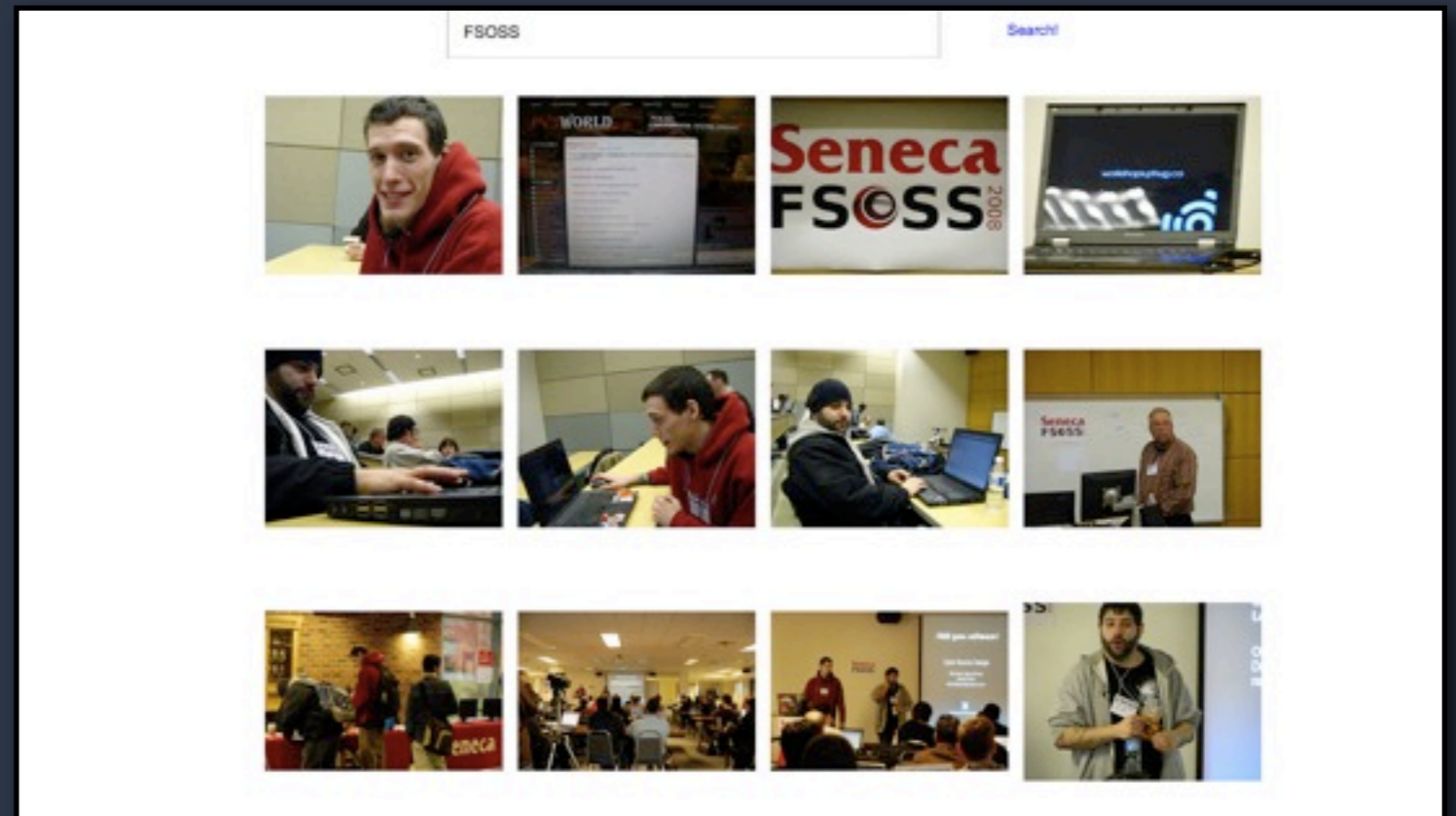
normalize the little things
for a consistent starting
point



FSS Applied

Layout

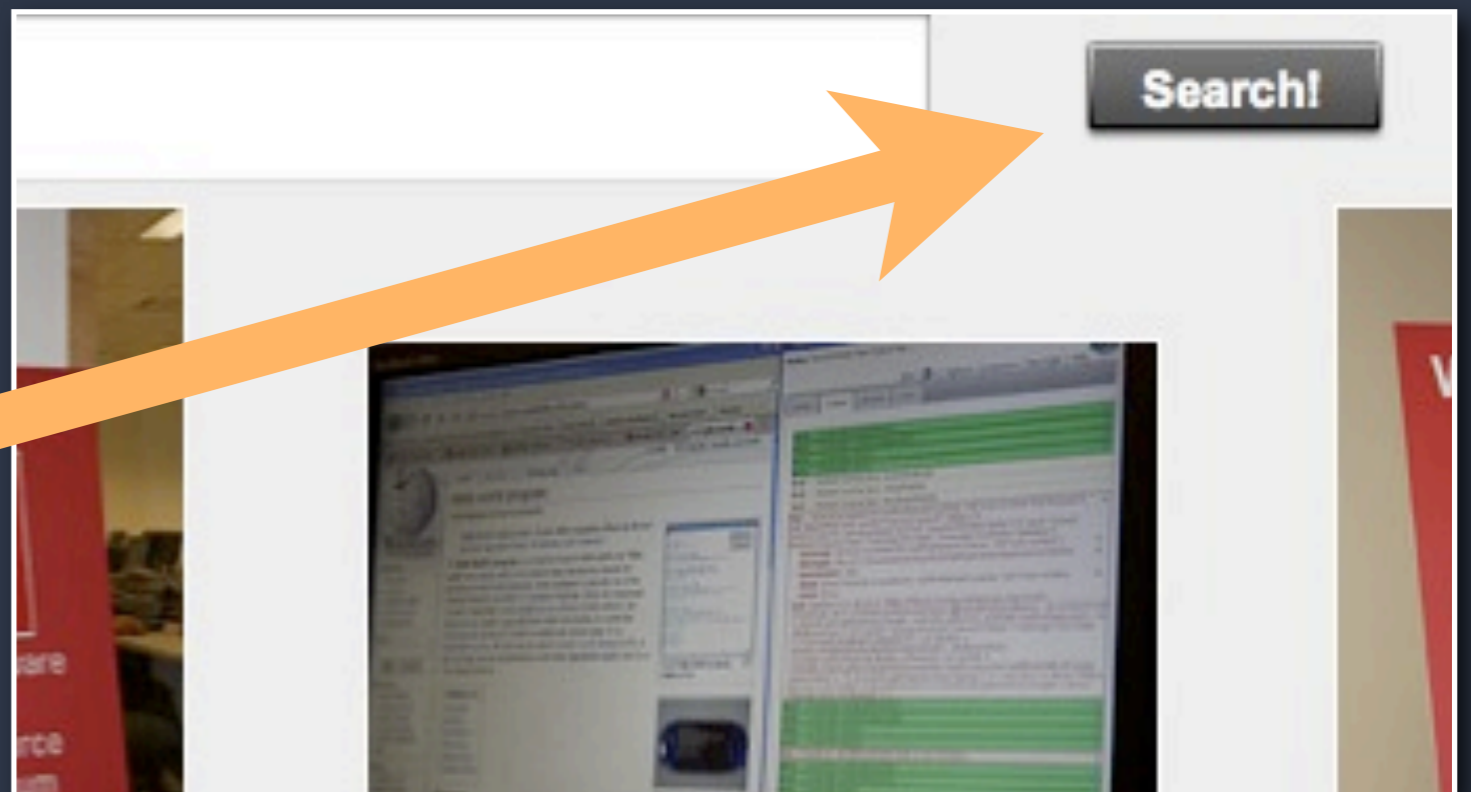
placement & containers



FSS Applied

Themes

style, colors and graphics



Mobile FSS

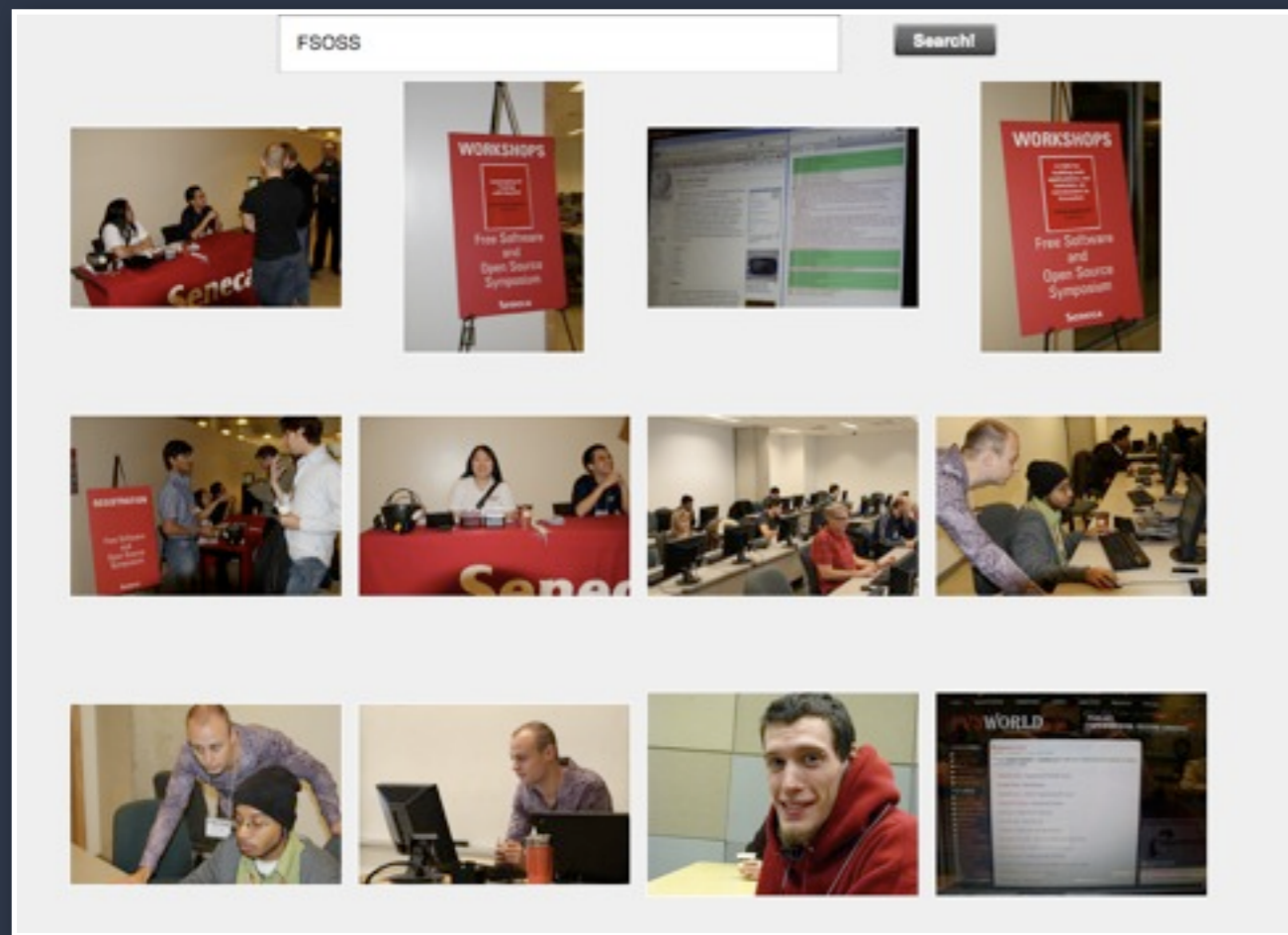
- Highly focused on target platforms
- Follows basic touchscreen UI guidelines from Apple and Android dev centres
- Repurposes FSS class names, enabling multi-platform content



Mobile FSS Applied

.fl-theme-coal

.fl-theme-iphone



=



Make it your own

.fl-theme-myTheme



Case Study: Fluid Engage





Fluid Engage

- Open source collaboration with museums
- Visitor engagement: learn and contribute
- Use phones visitors bring into the museum
- Mobile apps and in-gallery kiosks
- All built with open source Web technology



Our Mobile Approach

- No hard intrusions on your content
- Don't subvert good Web idioms
- Your choice: native-like or webbish



Infusion Mobile

- **mFSS**: themes for iPhone, Android, more
- **Components** designed for the mobile Web
- **ScreenNavigator**: unobtrusive mobile navigation



Museum Components

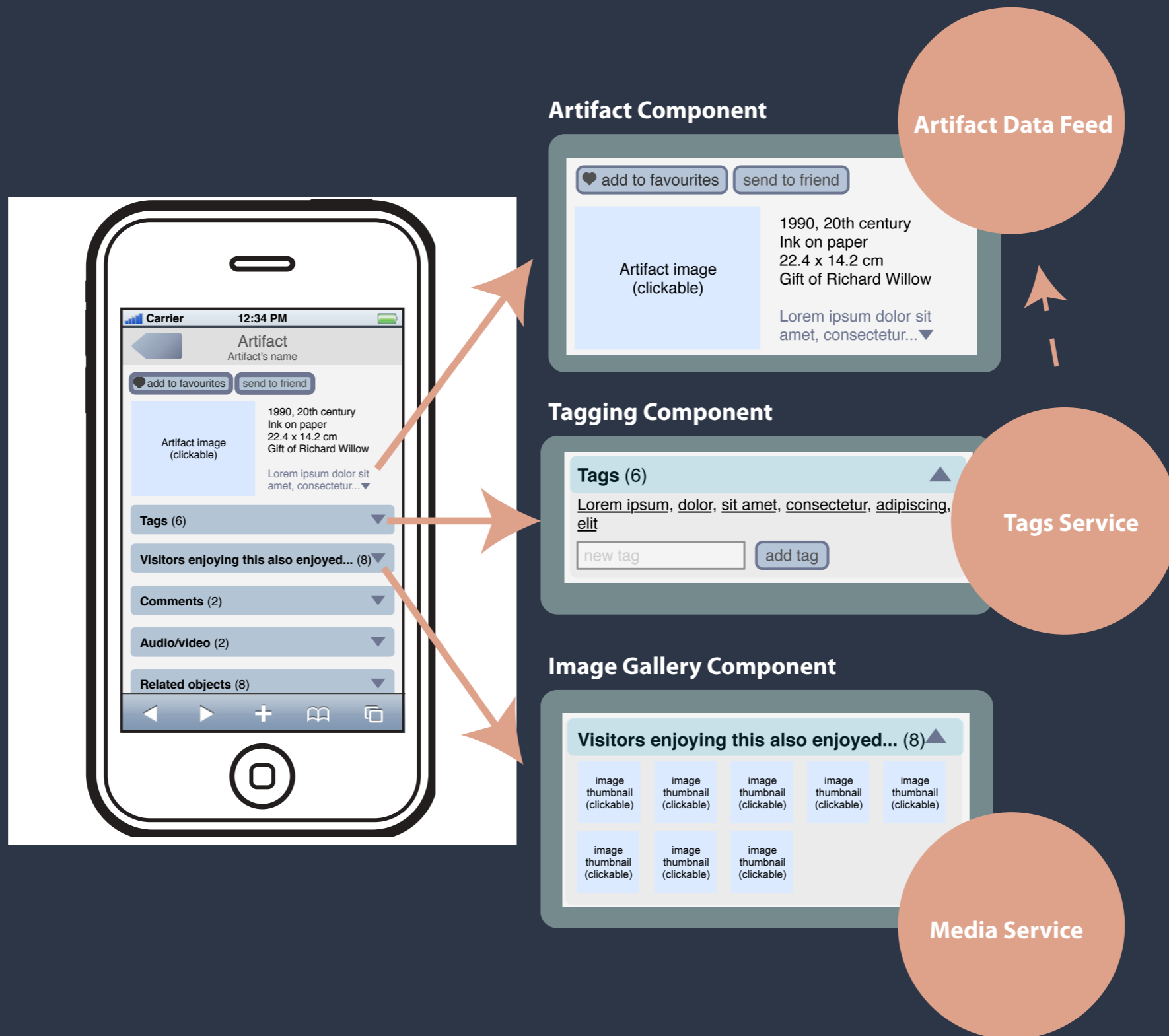
- Image Gallery
- Podcasts and video
- My Museum/My Collection
- Comments, Discussion, Stories
- Collection Browse and Search
- Tagging?

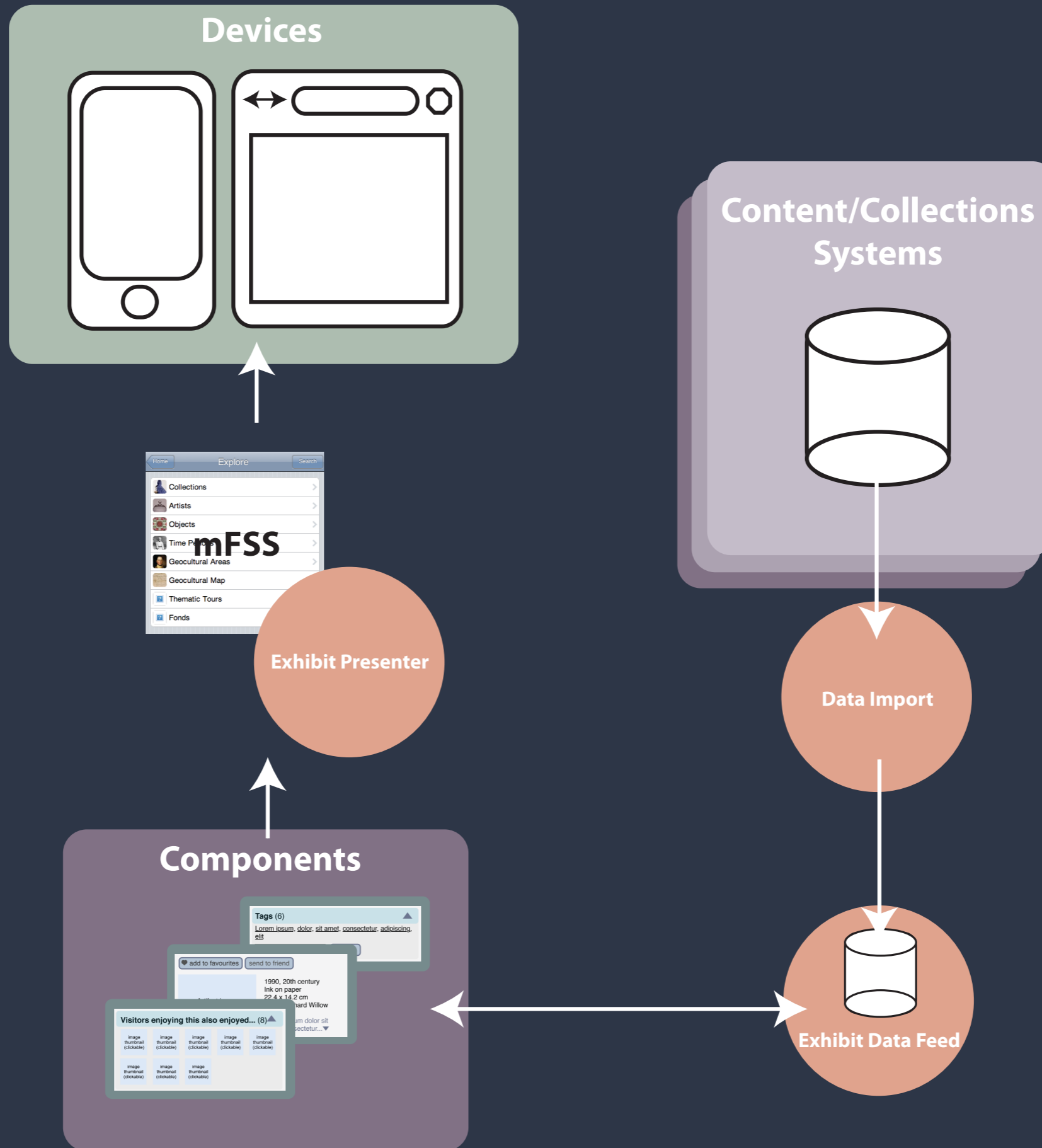
Engage's Architecture

- Simple, lightweight, and approachable
- JSON data feeds everywhere
- Client-side markup rendering
- Infusion wires it all together



Components + Services







Kettle: Server-side JS

- Built on top of the **JSGI** server spec
- Don't need lots of new APIs on server
- **Envjs** provides a full browser
- **Infusion** as application framework
- Choose where markup gets rendered
- **Natural, familiar** environment for Web developers and designers

Code!

<https://source.fluidproject.org/svn/scratchpad/mobile-workshop/trunk/>



WebKit-Specific Features



Adding a Home Screen Icon



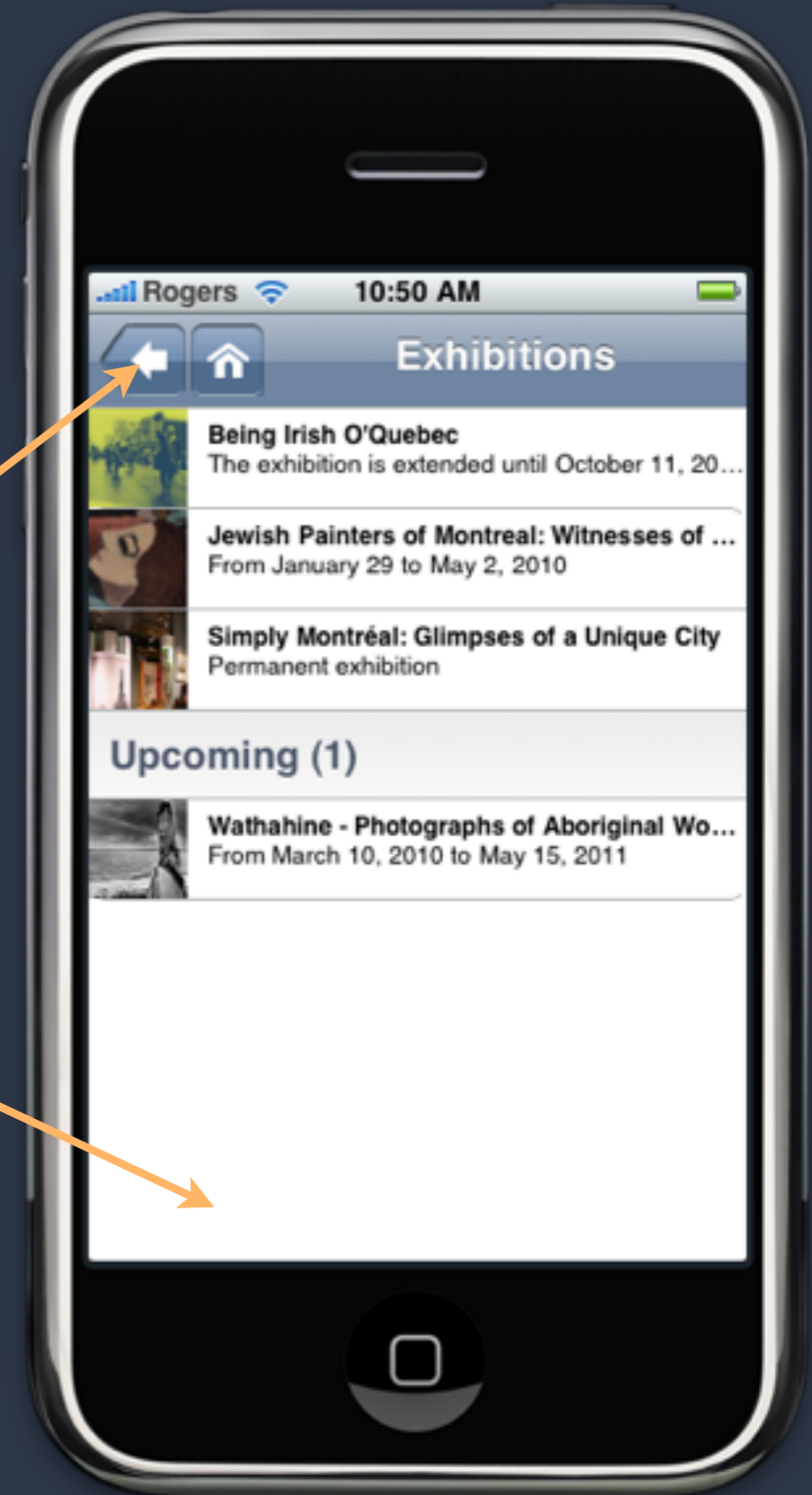
```
<link rel="apple-touch-icon" href="engage-apple-touch-icon.png" />
```

- Adds the linked icon to the iPhone home screen
- Icons must be 57 x 57 px
- iPhone will add rounded corners & reflection for you

Run As a Webapp

```
<meta name="apple-mobile-web-app-capable"
      content="yes" />
```

- Removes browser chrome
- All page transitions will cause Safari to pop
- Use Screen Navigator or `window.location` to intercept page transitions



Setting a fixed size

```
<meta name="viewport" content="width=device-width;  
initial-scale=1.0;  
maximum-scale=1.0;  
user-scalable=0;" />
```

- Sets the width of page to screen size
- Turns off zooming with pinch/pan



Removing Behaviour

```
<style type="text/css">
<!--
    * {
        -webkit-touch-callout: none;
    }
-->
</style>
```

- Prevents opening links in a new window
- Prevents saving images

Building with mFSS



mFSS: iPhone Theme

```
<head>  
  <link type="text/css" rel="stylesheet"  
        href="fss-mobile-layout.css" />  
  <link type="text/css" rel="stylesheet"  
        href="fss-mobile-theme-iphone.css" />  
</head>  
  
<body class="fl-theme-iphone">  
  
</body>
```



mFSS: Android Theme

```
<head>  
  <link type="text/css" rel="stylesheet"  
        href="fss-mobile-layout.css" />  
  <link type="text/css" rel="stylesheet"  
        href="fss-mobile-theme-android.css" />  
</head>  
  
<body class="fl-theme-android">  
  
</body>
```

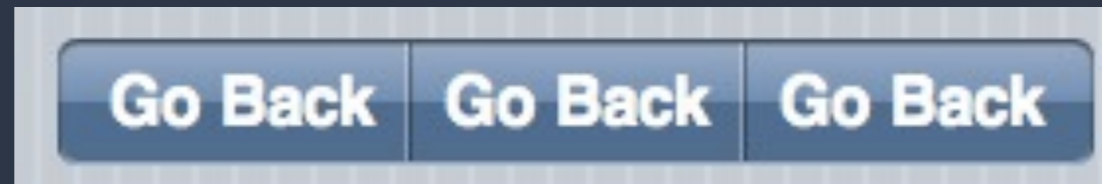


mFSS: Desktop

```
<head>  
  <link type="text/css" rel="stylesheet"  
        href="fss-layout.css" />  
  <link type="text/css" rel="stylesheet"  
        href="fss-theme-rust.css" />  
</head>  
<body class="fl-theme-rust">  
  
</body>
```



mFSS: Tabs



```
<ul class="fl-tabs">
  <li class="fl-tabs-active">
    <a href="#">Go Back</a>
  </li>
  <li>
    <a href="#">Go Back</a>
  </li>
  <li>
    <a href="#">Go Back</a>
  </li>
</ul>
```

mFSS: Buttons



```
<a class="fl-button fl-button-white" href="../index.html">  
    Go Back
```

```
</a>
```

```
<a class="fl-button fl-button-green" href="../index.html">  
    Go Back
```

```
</a>
```

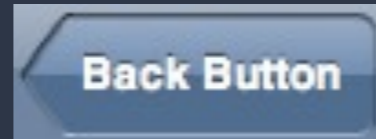
```
<a class="fl-button fl-button-blue" href="../index.html">  
    Go Back
```

```
</a>
```

```
<a class="fl-button fl-button-black" href="../index.html">  
    Go Back
```

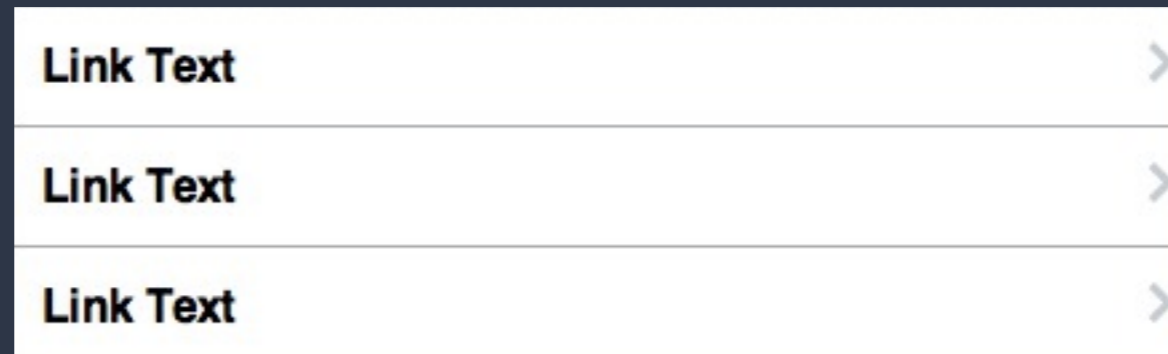
```
</a>
```

mFSS: Back Button



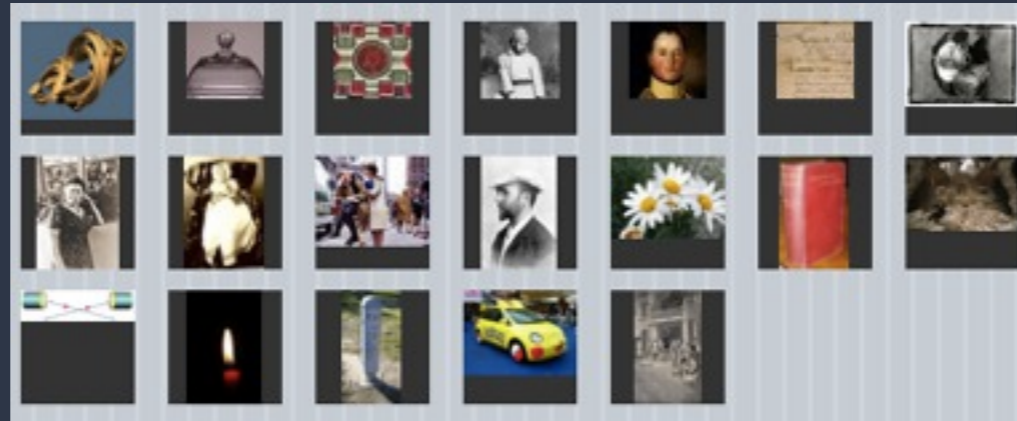
```
<a href="../../../mobile.html"
  class="fl-button fl-backButton">
  <span class="fl-button-inner">Back Button</span>
</a>
```

mFSS: Lists



```
<ul class="fl-list-menu">
  <li>
    <a href="#">Link Text</a>
  </li>
  <li>
    <a href="#">Link Text</a>
  </li>
  <li>
    <a href="#">Link Text</a>
  </li>
</ul>
```


mFSS: Image Grids



```
<ul class="fl-list-menu fl-list-thumbnails fl-grid">
  <li>
    <a href="20.png">
      
    </a>
  </li>
  <li>
    <a href="2.png">
      
    </a>
  </li>
</ul>
```

Infusion Mobile Components



Mobile Components

- Provide intuitive mobile interactions
- Navigation List, Cabinet, Screen Navigator
- A small but growing set: share yours!
- Goal: use them on both mobile and desktop
- Two key types: markup- and data-driven



Markup-Driven Components

- Progressive Enhancement style of JavaScript
- You provide the markup, we add the richness
- No assumptions about your data or content



Cabinet Illustrated

Info

Title:
Town and Country Resort

Description:
Location of the Jasig Spring 2010 Conference

Date:
2008-02-11 11:16:59

Tags

jasig

jasigsandiego10

jasigsandiego2010

About the Cabinet

- Like an accordion...
- Has the ability to open multiple “drawers” at once
- Any HTML content can go inside
- Helps keep a page simple by hiding things until the user wants to see them

Cabinet: Structure

Drawer

Info

Title:
Town and Country Resort

Description:
Location of the Jasig Spring 2010 Conference

Date:
2008-02-11 11:16:59

Tags

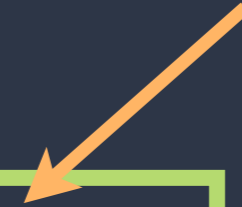
jasig jasigsandiego10 jasigsandiego2010

Cabinet: Structure

Drawer



Handle



Info

Title:
Town and Country Resort

Description:
Location of the Jasig Spring 2010 Conference

Date:
2008-02-11 11:16:59

Tags

jasig jasigsandiego10 jasigsandiego2010

Cabinet: Structure

Drawer

Handle

The diagram illustrates the structure of a 'Cabinet' component. It consists of several nested and adjacent elements:

- Drawer:** A light green border surrounding the entire content area.
- Handle:** An orange border surrounding the top and right sides of the content area.
- Content:** A dark red border surrounding the main text area.

The content area is divided into sections:

- Info:** A header section.
- Title:** **Town and Country Resort**
- Description:** **Location of the Jasig Spring 2010 Conference**
- Date:** **2008-02-11 11:16:59**

Below the content area is a **Tags** section with three tags: **jasig**, **jasigsandiego10**, and **jasigsandiego2010**.

Content

Cabinet: Markup

Drawer

```
<div class="flc-cabinet">  
  <div class="flc-cabinet-drawer">  
    <div class="flc-cabinet-handle">  
      Can Cats Drink Beer?  
    </div>  
    <div class="flc-cabinet-contents">  
      <!-- Your markup goes here -->  
    </div>  
  </div>  
</div>
```

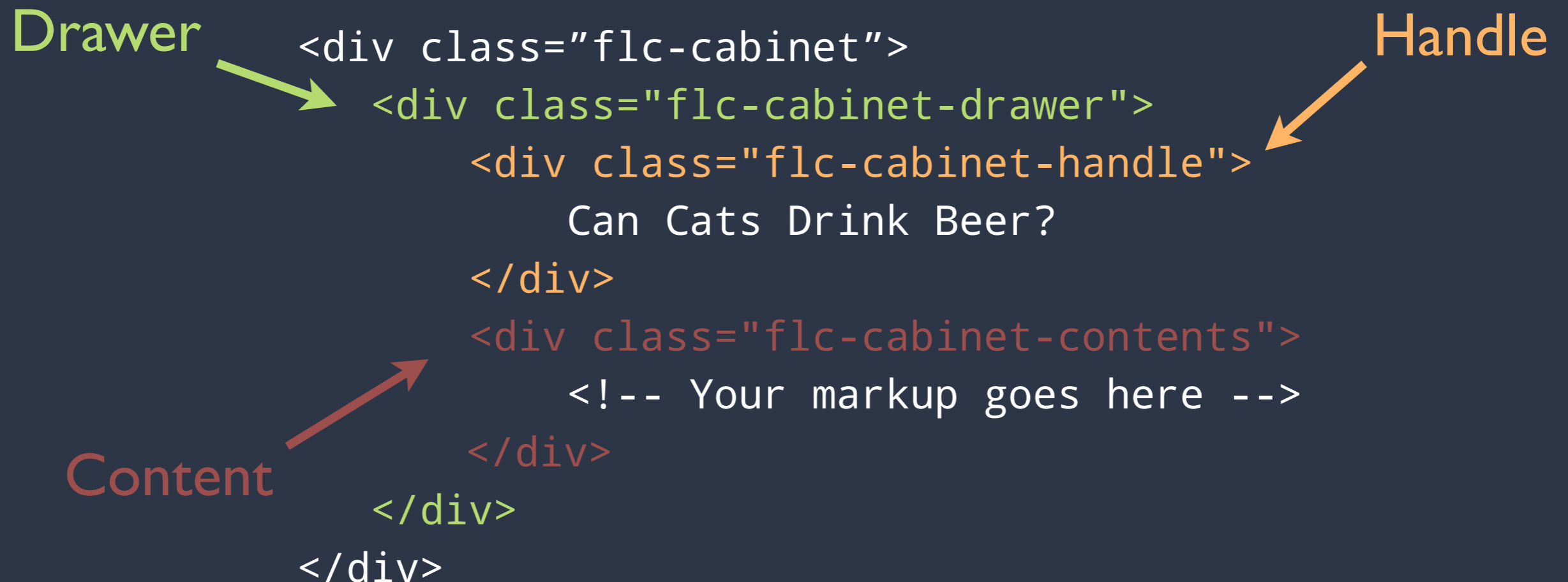
Cabinet: Markup

Drawer

```
<div class="flc-cabinet">  
  <div class="flc-cabinet-drawer">  
    <div class="flc-cabinet-handle">  
      Can Cats Drink Beer?  
    </div>  
    <div class="flc-cabinet-contents">  
      <!-- Your markup goes here -->  
    </div>  
  </div>  
</div>
```

Handle

Cabinet: Markup



Creating a Cabinet

```
fluid.cabinet(".flc-cabinet", options);
```



Cabinet Options

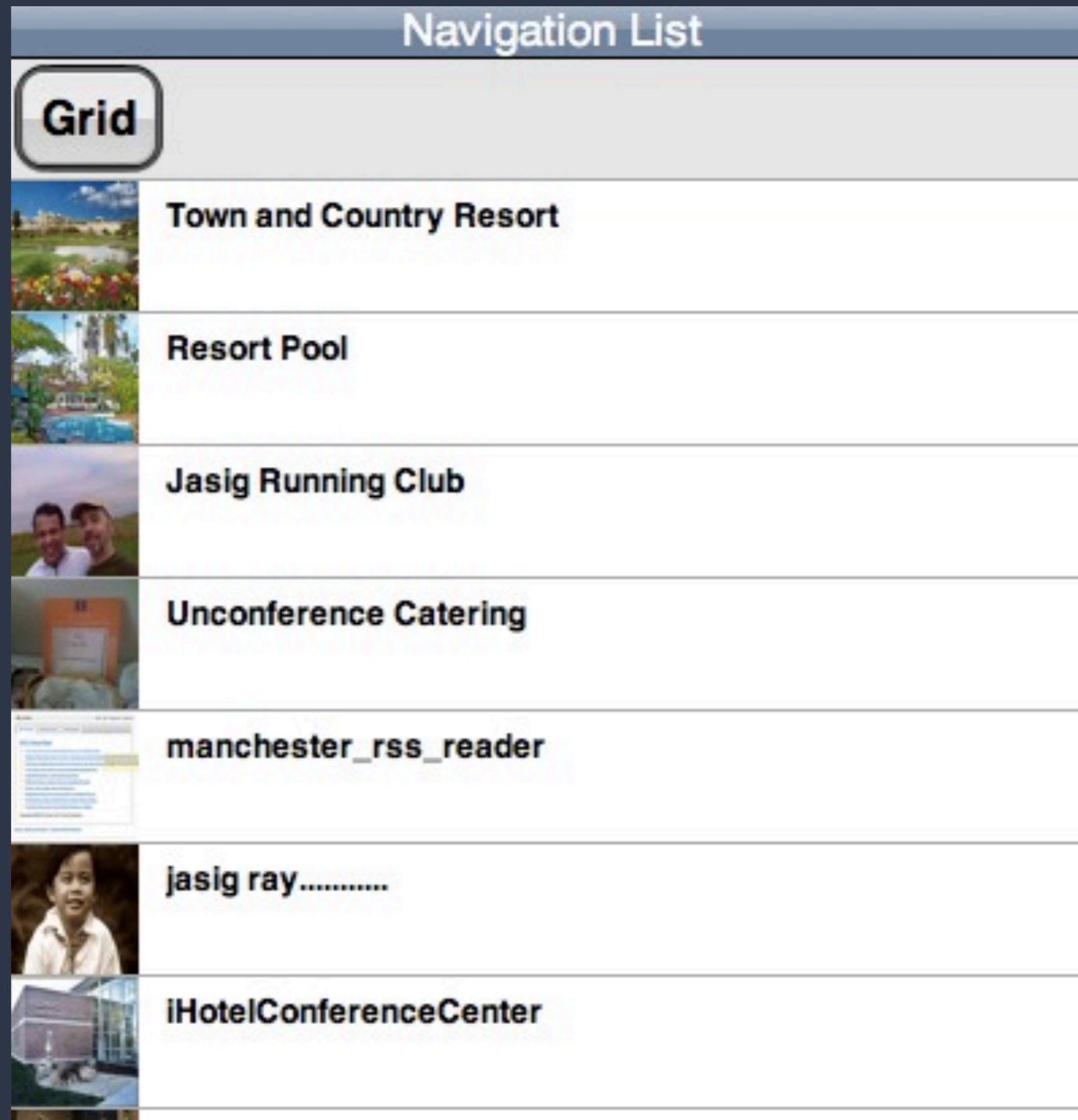
```
{  
  events: {  
    afterOpen: null,  
    afterClose: null  
  },  
  startOpen: false  
}
```

Model-Driven Rendering

- Data feed-oriented
- Model, View, no controller
- You give us JSON, we render it for you
- Template and styles are fully customizable

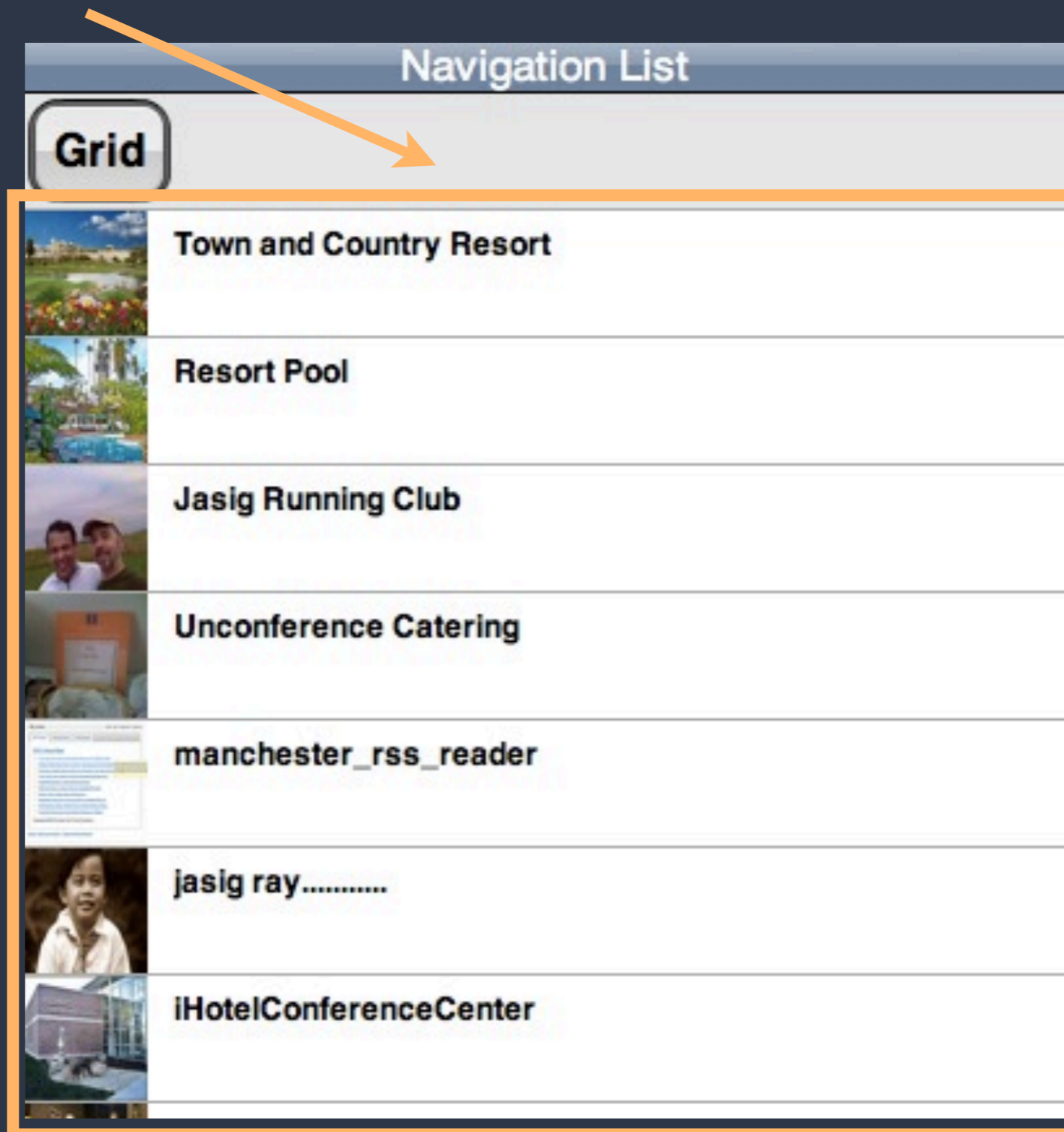


Navigation List Illustrated



Navigation List: Structure

Component's Container



Navigation List: Structure

Component's Container

Navigation List

Grid

- Town and Country Resort
- Resort Pool
- Jasig Running Club
- Unconference Catering
- manchester_rss_reader
- jasig ray.....
- iHotelConferenceCenter

List Item

Navigation List: Structure

Component's Container

Navigation List

Grid

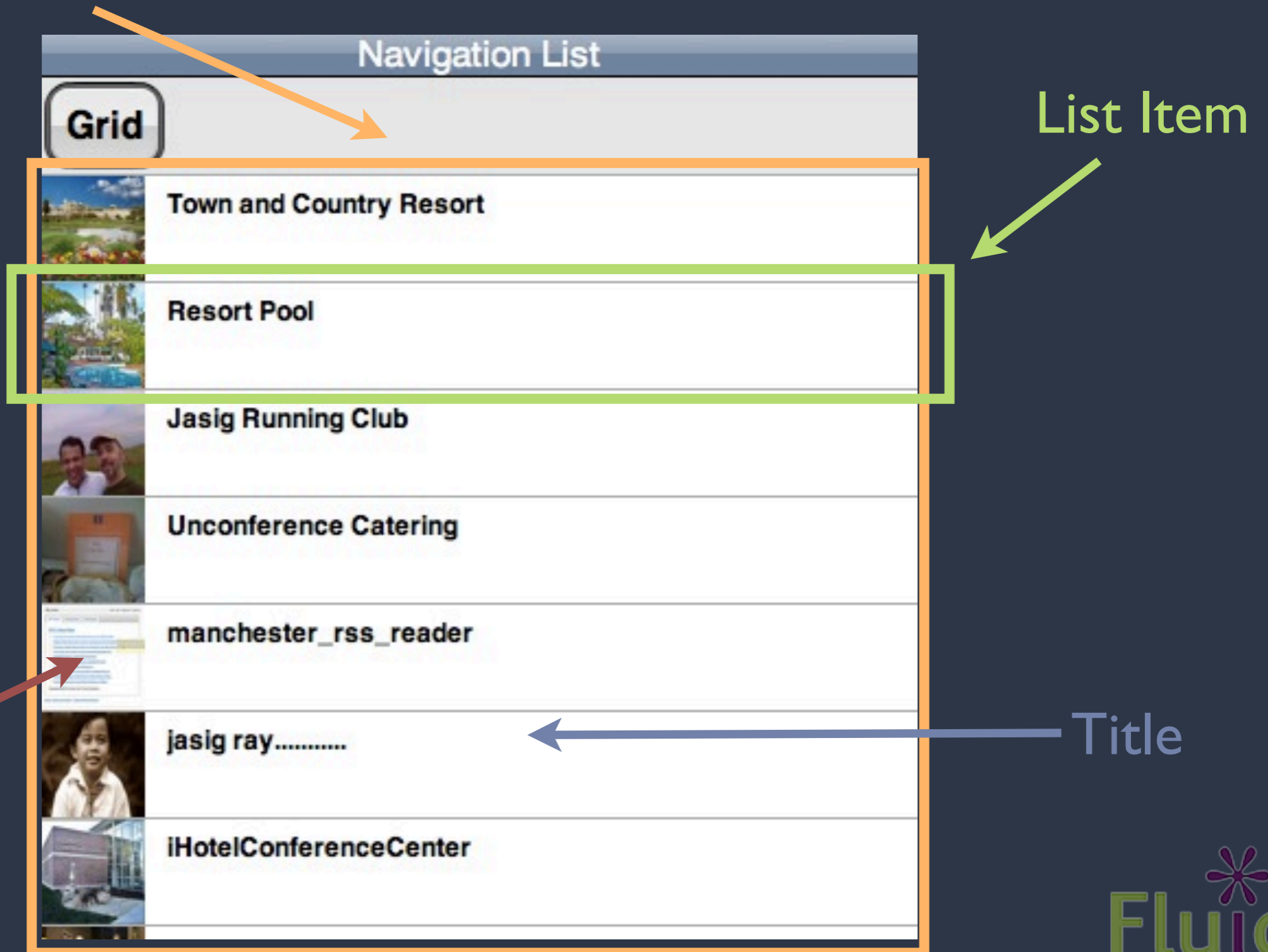
- Town and Country Resort
- Resort Pool
- Jasig Running Club
- Unconference Catering
- manchester_rss_reader
- jasig ray.....
- iHotelConferenceCenter

List Item

Thumbnail

Navigation List: Structure

Component's Container



Thumbnail

Navigation List: Markup

```
<div class="flc-navigationList"> ← Component's Container
  <ul class="flc-navigationList-listGroup
    fl-navigationList-container
    fl-list
    fl-list-menu
    fl-list-thumbnails">
    <li class="flc-navigationList-items">
      <div class="flc-navigationList-linkContainer">
        <a class="flc-navigationList-link fl-engage-badged-thumbnail">
          <img class="flc-navigationList-image fl-icon"/>
          <div class="fl-navigationList-textContainer">
            <span class="flc-navigationList-titleText
              fl-navigationList-title">
              Title
            </span>
            <span class="flc-navigationList-descriptionText
              fl-link-summary fl-navigationList-description">
              Description
            </span>
          </div>
        </a>
      </div>
    </li>
  </ul>
</div>
```



Navigation List: Markup

```
<div class="flc-navigationList"> ← Component's Container
  <ul class="flc-navigationList-listGroup
    fl-navigationList-container
    fl-list
    fl-list-menu
    fl-list-thumbnails">
    <li class="flc-navigationList-items"> ← List item template
      <div class="flc-navigationList-linkContainer">
        <a class="flc-navigationList-link fl-engage-badged-thumbnail">
          <img class="flc-navigationList-image fl-icon"/>
          <div class="fl-navigationList-textContainer">
            <span class="flc-navigationList-titleText
              fl-navigationList-title">
              Title
            </span>
            <span class="flc-navigationList-descriptionText
              fl-link-summary fl-navigationList-description">
              Description
            </span>
          </div>
        </a>
      </div>
    </li>
  </ul>
</div>
```



Navigation List: Markup

```
<div class="flc-navigationList"> ← Component's Container
  <ul class="flc-navigationList-listGroup
    fl-navigationList-container
    fl-list
    fl-list-menu
    fl-list-thumbnails">
    <li class="flc-navigationList-items"> ← List item template
      <div class="flc-navigationList-linkContainer">
        <a class="flc-navigationList-link fl-engage-badged-thumbnail">
          <img class="flc-navigationList-image fl-icon"/>
          <div class="fl-navigationList-textContainer">
            <span class="flc-navigationList-titleText
              fl-navigationList-title">
              Title
            </span>
            <span class="flc-navigationList-descriptionText
              fl-link-summary fl-navigationList-description">
              Description
            </span>
          </div>
        </a>
      </div>
    </li>
  </ul>
</div>
```

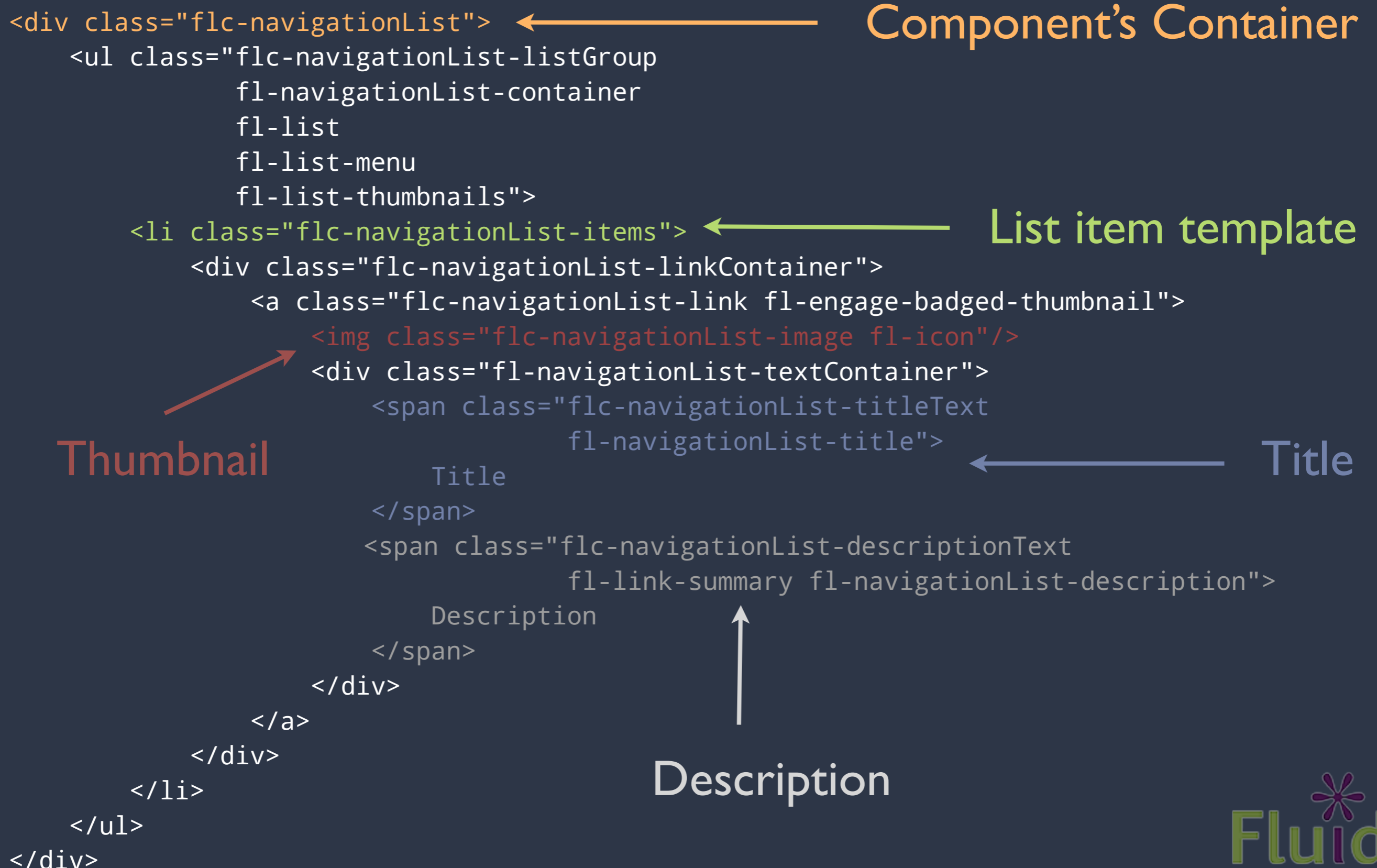
Thumbnail →

Navigation List: Markup

```
<div class="flc-navigationList"> ← Component's Container
  <ul class="flc-navigationList-listGroup
    fl-navigationList-container
    fl-list
    fl-list-menu
    fl-list-thumbnails">
    <li class="flc-navigationList-items"> ← List item template
      <div class="flc-navigationList-linkContainer">
        <a class="flc-navigationList-link fl-engage-badged-thumbnail">
          <img class="flc-navigationList-image fl-icon"/>
          <div class="fl-navigationList-textContainer">
            <span class="flc-navigationList-titleText
              fl-navigationList-title"> ← Title
              Title
            </span>
            <span class="flc-navigationList-descriptionText
              fl-link-summary fl-navigationList-description">
              Description
            </span>
          </div>
        </a>
      </div>
    </li>
  </ul>
</div>
```

Thumbnail (points to the `` tag)

Navigation List: Markup



Nav List's Model

```
[{  
  image: "http://myServer.org/pic.png",  
  target: "/viewImage?pic=12345",  
  title: "My Great Picture!",  
  description: "A picture of my moustache."  
},  
{  
  image: "http://myServer.org/anotherPic.png",  
  target: "/viewImage?pic=67890",  
  title: "This picture, not so good.",  
  description: "A picture of my cat."  
}]
```

Domain Model: Flickr

```
[{
  "id": "4366552930",
  "owner": "29979136@N03",
  "secret": "30a7167c6a",
  "server": "2777",
  "farm": 3,
  "title": "Town and Country Resort",
  "ispublic": 1,
  "isfriend": 0,
  "isfamily": 0
},
{
  "id": "4365808141",
  "owner": "29979136@N03",
  "secret": "2c818b926e",
  "server": "4058",
  "farm": 5,
  "title": "Resort Pool",
  "ispublic": 1,
  "isfriend": 0,
  "isfamily": 0
}]
```



Transforming Your Model

```
var imageURLTemplate = "http://farm%farm.static.flickr.com/%server/%id_%secret_m.jpg";  
var userPageURLTemplate = "http://www.flickr.com/photos/%owner/%id";
```

```
var mapData = function (flickrData) {  
  var navListModel = fluid.transform(flickrData.photos.photo, function (photo) {  
    return {  
      image: fluid.stringTemplate(imageURLTemplate, photo),  
      target: fluid.stringTemplate(userPageURLTemplate, photo),  
      title: photo.title  
    };  
  });  
};
```



Creating a Nav List

```
var templateUrl = "../../../fluid-engage-core/components/" +  
    "navigationList/html/" +  
    "NavigationList.html .flc-navigationList";
```

```
// Load Nav List's HTML template via AJAX  
container.load(templateURL, null, function () {  
    // When the template has loaded, instantiate a Nav List  
    var navList = fluid.navigationList(container, {  
        model: mapData(jasigFlickrPhotos)  
    });  
});
```



Optimizing Performance



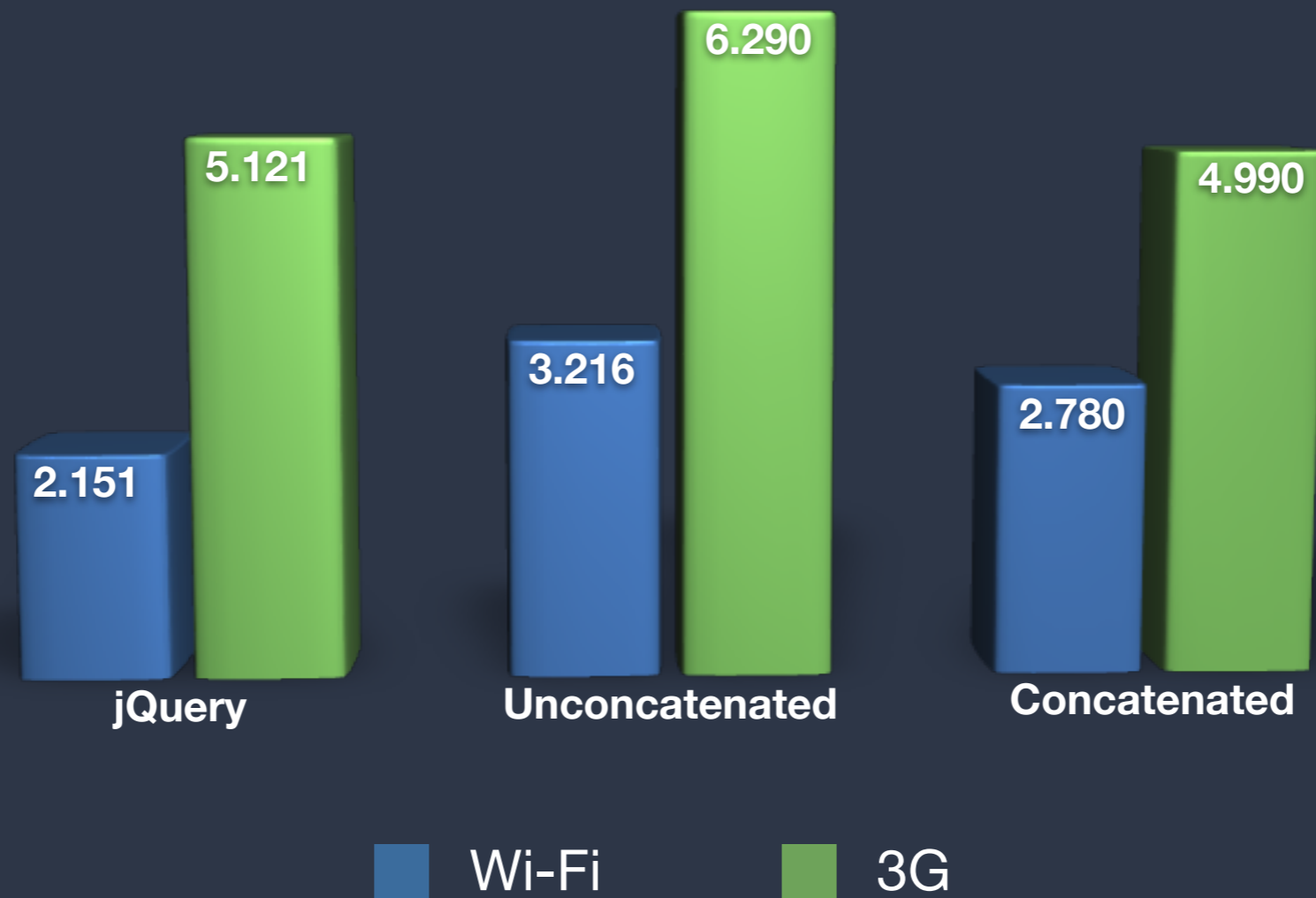
Will My Web Site Scale?

Yes...

...and no.



Will My Web Site Scale?



	jQuery	Unconcatenated	Concatenated
Wi-Fi	2.151	3.216	2.78
3G	5.121	6.29	4.99

Mobile Performance Factors

- Great browsers make us forget the CPU
- At heart, mobile apps are heavily CPU-bound
- Connection limitations:
 - Often slow (EDGE vs. 3G vs. WiFi)
 - Often flakey



Performance Heuristics

- Connection speed: *minimize server roundtrips*
- CPU speed: *minimize JavaScript evaluation*



Device Constraints

How fast is your desktop computer?



Mobile Device Constraints

iPhone 3G	412 MHz
iPhone 3GS	600 MHz
Android G1	528 MHz
Motorola Droid	550 MHz
Nexus One	1 GHz

Minimize Server Roundtrips

- Minify JavaScript and CSS
- Concatenate JavaScript resources
- Use image sprites



Minimize JavaScript eval()

- Your code will start up way slower on mobile
- Don't load the same JS over and over again
- Carefully consider dependencies
- Use an all-in-one page style: Screen Navigator



Using Screen Navigator

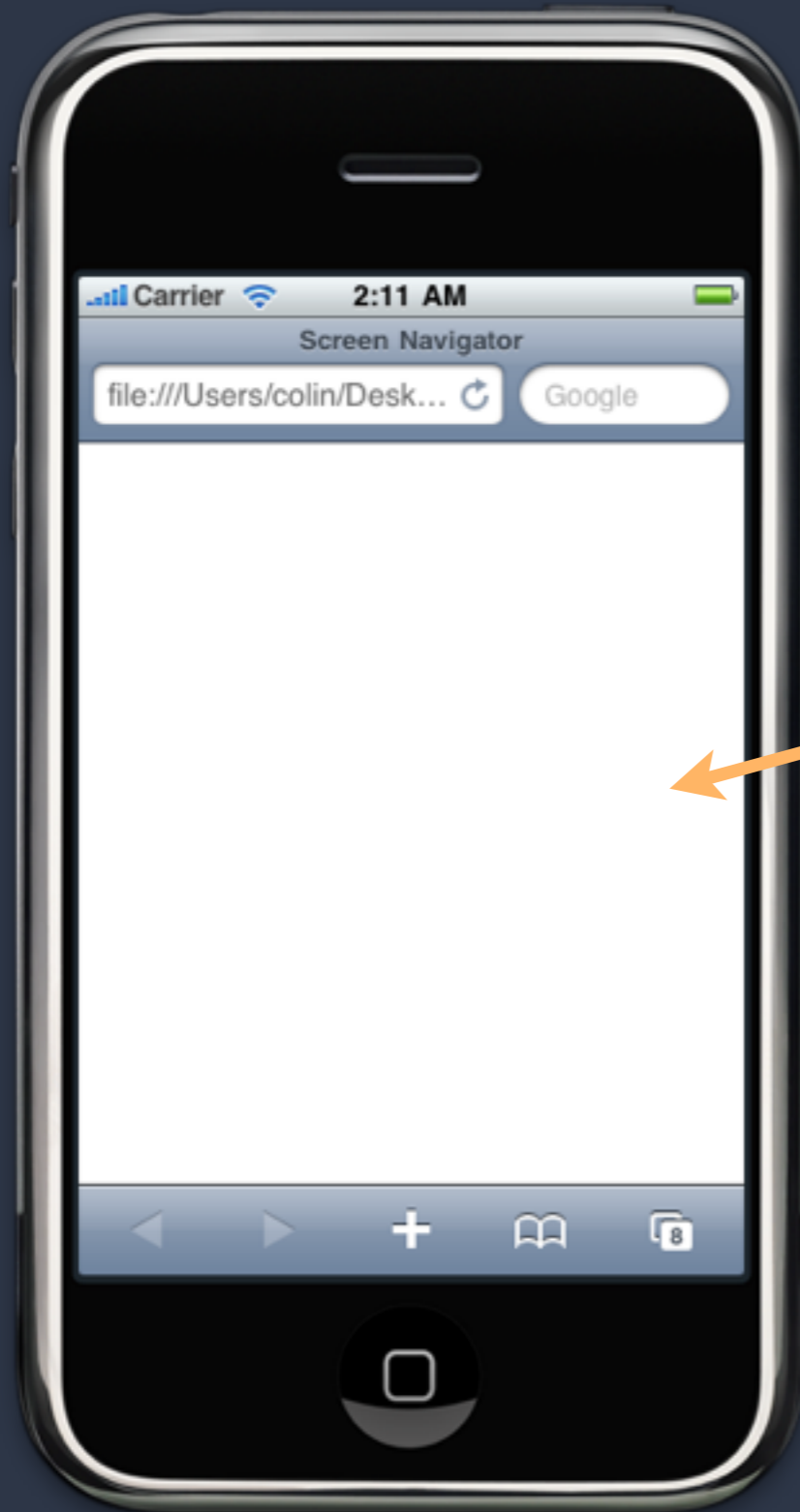


Screen Navigator

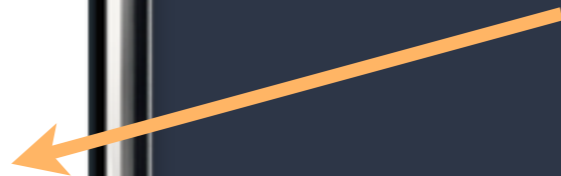
- All in one page idiom: no full page transitions
- Load shared dependencies up-front
- Lazily load unique dependencies
- A mini, client-side AJAX portal
- Unobtrusive: content still works like it used to



Screen Navigator Illustrated



XHR



Screen Navigator: How it Works

- Intercepts all potential page transitions
 - Link clicks, form submits, etc.
- Loads the href via AJAX
- Compares scripts and links: only injects new stuff
- Injects the page's body into a `<div>`



URLs and Screen Navigator

- We assume your Web app is URL addressable
- Avoid breaking the back button and bookmarking:
- Store URL state in `window.location.hash`
- jQuery `onhashchange` plugin

Look here!



http://fluidengage.org/engage/home/home.html#exhibitions/view.html?db=mccord_exhibitions&id=4&lang=en

Screen Navigator: Markup

```
<html xmlns="http://www.w3.org/1999/xhtml" lang="en" xml:lang="en">
  <head>
    <link rel="apple-touch-icon" href="../../../fluid-engage-core/components/home/images/apple-touch-icon.png"/>
    <meta name="viewport" content="width=device-width; initial-scale=1.0; maximum-scale=1.0; user-scalable=0;" />
    <meta name="apple-mobile-web-app-capable" content="yes" />
    <title>McCord</title>

    <link rel="apple-touch-icon" href="../../../fluid-engage-core/components/home/images/apple-touch-icon.png"/>

    <!-- Your stylesheets go here -->
    <!-- Your JavaScript dependencies go here -->

    <!-- Screen Navigator's dependencies -->
    <script type="text/javascript" src="../../../fluid-infusion/src/webapp/lib/jquery/core/js/jquery.js"></script>
    <script type="text/javascript" src="../../../fluid-infusion/src/webapp/lib/json/js/json2.js"></script>
    <script type="text/javascript" src="../../../fluid-infusion/src/webapp/framework/core/js/Fluid.js"></script>
    <script type="text/javascript" src="../../../fluid-engage-core/framework/js/kettleCore.js"></script>
    <script type="text/javascript" src="../../../fluid-engage-core/framework/js/URLUtilities.js"></script>
    <script type="text/javascript"
      src="../../../fluid-engage-core/lib/jquery/plugins/hashchange/js/jquery.ba-hashchange.js"></script>

    <!-- Screen Navigator itself -->
    <script type="text/javascript" src="../js/condenser.js"></script>
  </head>

  <body class="fl-theme-iphone fl-home-white-background">

    <div class="flc-navigator-portal">
    </div>

  </body>
</html>
```

Shared Dependencies

Empty Container



Instantiating Screen Navigator

```
fluid.engage.screenNavigator(".flc-navigator-portal",  
                             "../app/home.html");
```



Fluid Engage Code Tour?



Questions?

