



# Designing Mobile Web Mapping Applications

Andy Gup  
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Esri Developer Summit  
Washington, DC



Twitter Bootstrap

&

jQuery Mobile

# Who am I?

Andy Gup

Developer Evangelist

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[github.com/agup](https://github.com/agup)

@agup

# Bootstrap

- Responsive, Fluid Grid
- Desktop, Table, Phone

# jQuery Mobile (+ similar JS libs)

- Fixed or Responsive Grid
- Tablet and/or Phone

# Speed Bump

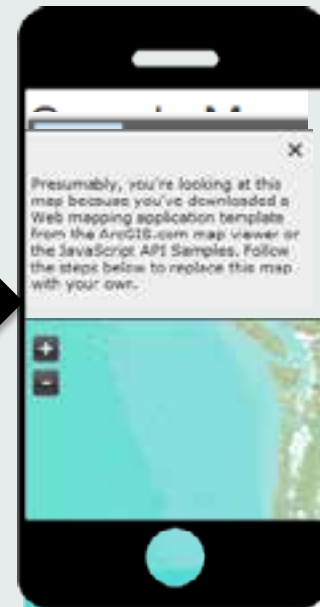
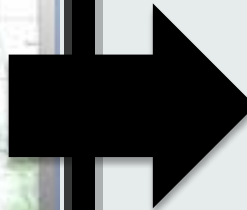
By Dave Coverly

DIGITAL CREATORS  
SPEEDBUMP.COM  
©2013 COVERLY  
9.10

IT SAYS, "THIS FILM  
HAS BEEN FORMATTED TO  
FIT YOUR PHONE."



# Default Behavior



# Responsive Design

§ Single web app that works *well* across a variety of devices/screen sizes

§ Re-use content and software

§ Considers

§ Device limitations

§ User's behavior



# Responsive Design Components

1. Fluid Grid System
2. Media Queries
3. HTML5, CSS & JavaScript



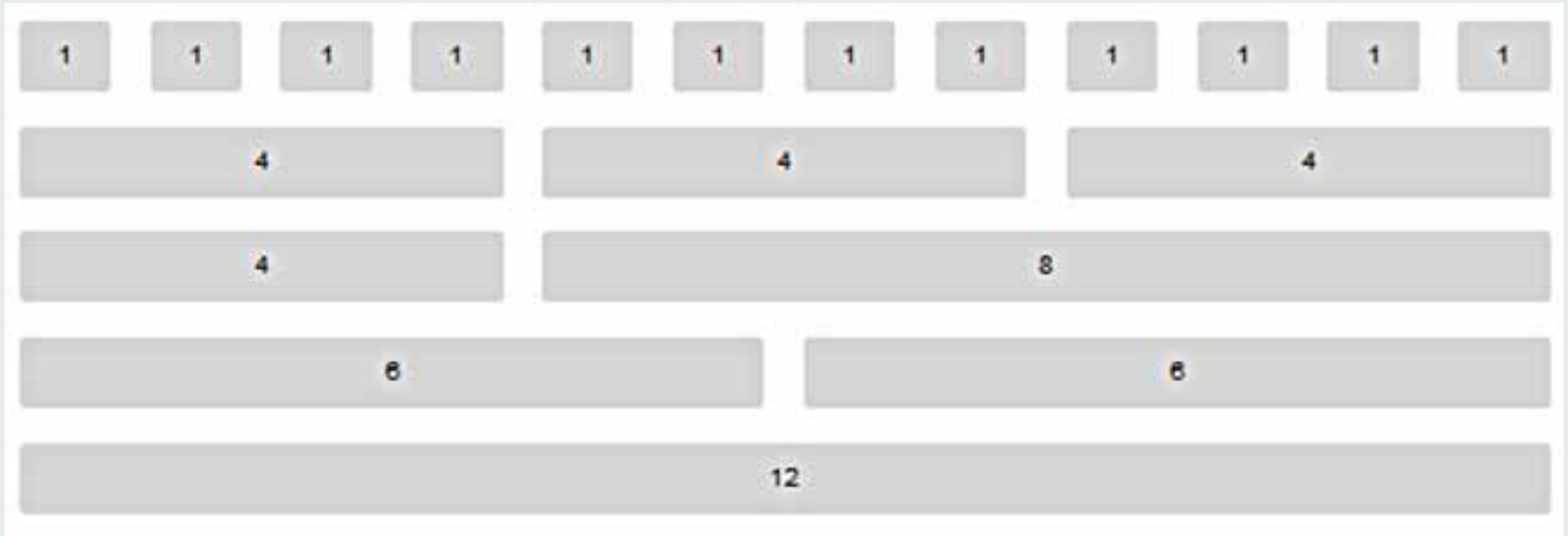
# Fluid Grid System

§ Layout adapts to different screen sizes

§ Based on percentages

§ 12 column / 960px

# Fluid Grid System



# Media Queries

- § Detect device screen size and orientation
- § Apply CSS at specific break points
- § Typical: 480px, 768px, 1024px, 1280px

```
@media only screen and (max-device-width:480px) {  
  
    /* Custom css styles */  
    body {  
        font-size: 0.5em;  
    }  
    #titleArea{  
        display: none;  
    }  
}
```

# mediaqueri.es

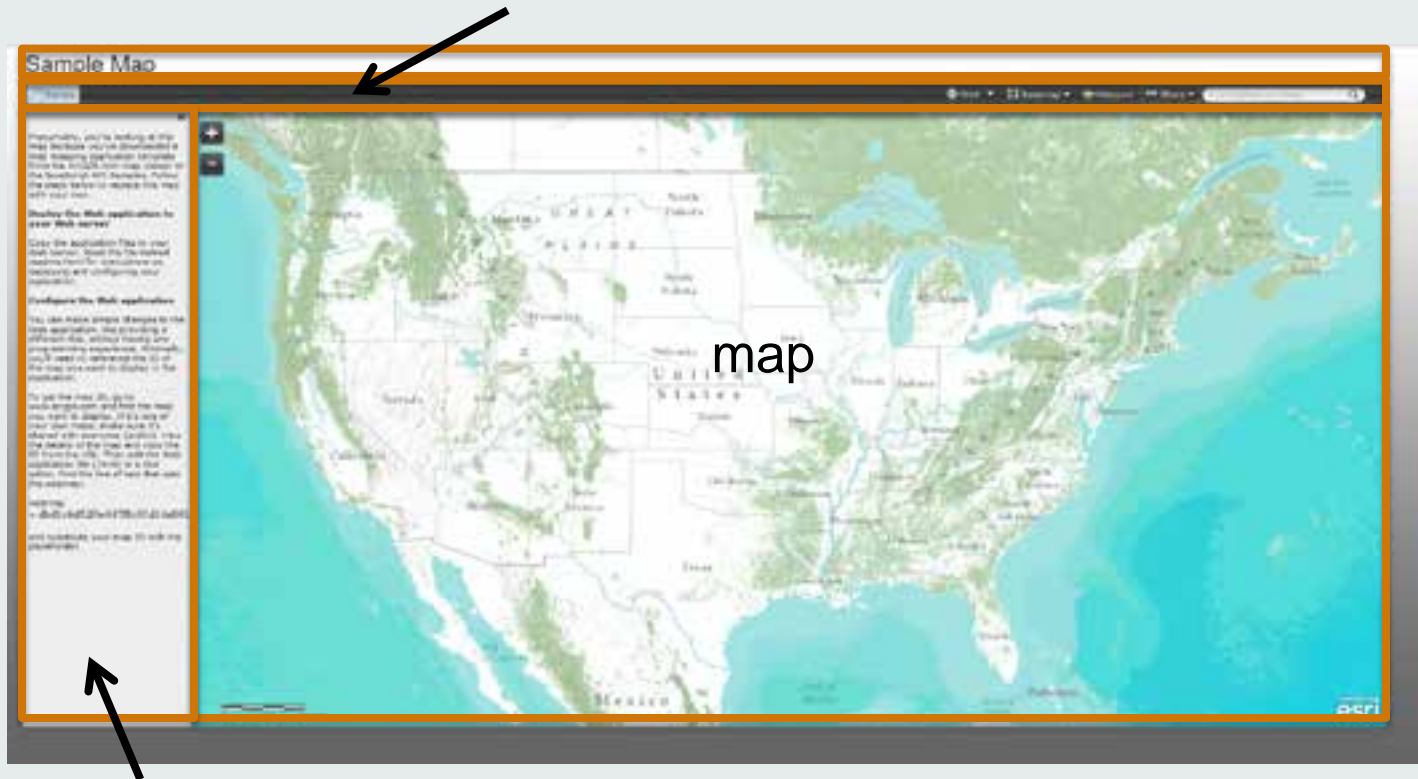


**How does  
responsive  
work?**

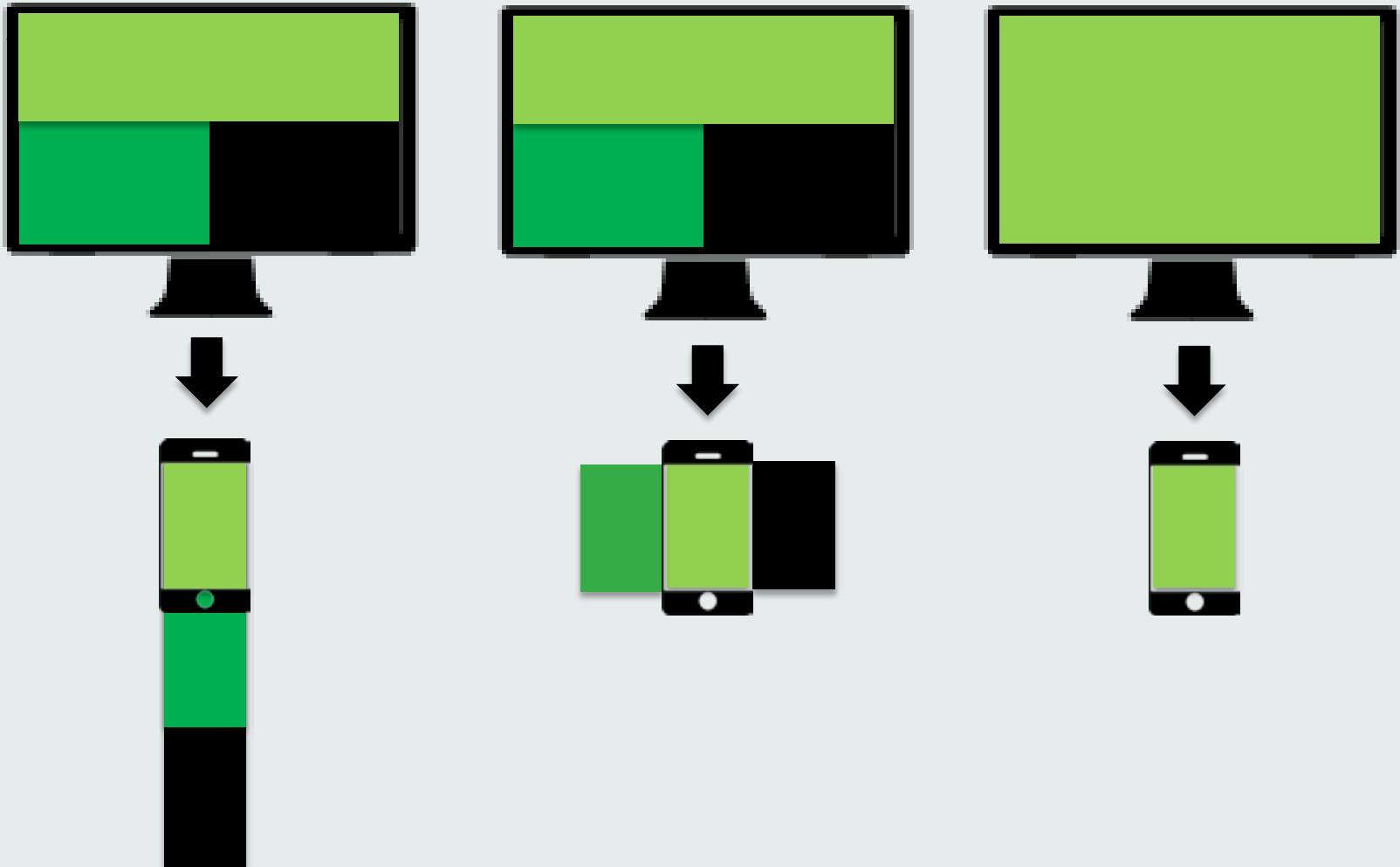


# Typical “full-view” Mapping App

## 3 Row – 2 Column



# Responsive Grid Layouts



# Large: 3 Rows - 3 Columns



**$\geq$  1280px**

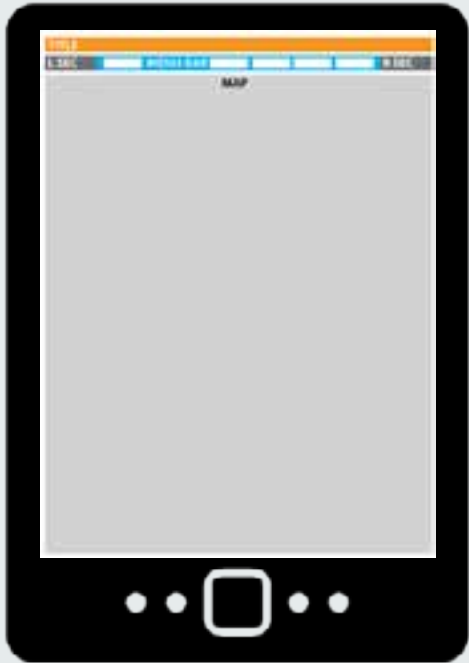


# Medium: 2 Columns



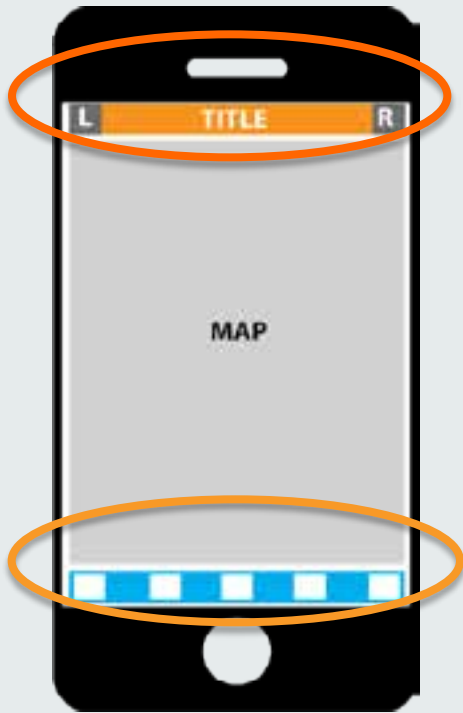
**1024 - 1280px**

# Small: Single Column



**768 - 1024px**

# Extra Small: 1 Column, Minimized



**= < 768px**

# Responsive HTML5 Application



# Esri's open source responsive libs

github.com/esri/...

[responsive-map-js](#)

[bootstrap-map-js](#)

[dojo-bootstrap-ui-for-maps-js](#)

# [ami.responsivedesign.is](http://ami.responsivedesign.is)



# Responsive Web Frameworks

§ Bootstrap 3

§ Foundation 3

§ Skeleton

§ YAML 4

§ jQuery Mobile Responsive Grid

# Bootstrap-map-js

- § Bootstrap ver 3 framework
- § Responsive map
- § Resize and re-center
- § Pop-ups, widgets
- § Touch
- § CSS Styles



# Step 1: Get bootstrap-map-js

[github.com/Esri/bootstrap-map-js](https://github.com/Esri/bootstrap-map-js)

# Step 2: Create a page

```
<!DOCTYPE html>
<html>
  <head>
    <title>Bootstrap 101 Template</title>
    <meta name="viewport" content="width=device-width, initial-
scale=1.0">
    <!-- Bootstrap -->
    <link href="../../assets/css/bootstrap.min.css" rel="stylesheet"
media="screen">
  </head>
  <body>

    <h1>Hello, world!</h1>

    <!-- jQuery (for Bootstrap's JavaScript plugins) -->
    <script src="../../assets/js/jquery.js"></script>
    <!-- Include all plugins or individual files as needed -->
    <script src="../../assets/js/bootstrap.min.js"></script>
  </body>
</html>
```

# Step 2: Create a page

```
<!DOCTYPE html>
<html>
  <head>
    <title>Bootstrap 101 Template</title>
    <meta name="viewport" content="width=device-width, initial-
scale=1.0">
    <!-- Bootstrap -->
    <link href="../../assets/css/bootstrap.min.css" rel="stylesheet"
media="screen">
  </head>
  <body>

    <h1>Hello, world!</h1>

    <!-- jQuery (for Bootstrap's JavaScript plugins) -->
    <script src="../../assets/js/jquery.js"></script>
    <!-- Include all plugins or individual files as needed -->
    <script src="../../assets/js/bootstrap.min.js"></script>
  </body>
</html>
```

# Step 3: Style map div

```
<!-- ArcGIS css -->  
<link rel="stylesheet" type="text/css"  
href="http://js.arcgis.com/3.7/js/esri/css/esri.css">
```

```
<!-- Bootstrap-map-js css -->
```

```
<link rel="stylesheet" type="text/css" href="../../src/css/bootstrapmap.css">
```

```
<style type="text/css">  
  #mapDiv {  
    min-height: 100px;  
    max-height: 1000px;  
  }  
</style>
```

# Step 3: Style map div

```
<!-- ArcGIS css -->
<link rel="stylesheet" type="text/css"
href="http://js.arcgis.com/3.7/js/esri/css/esri.css">

<!-- Bootstrap-map-js css -->
<link rel="stylesheet" type="text/css" href="../../src/css/bootstrapmap.css">

<style type="text/css">
  #mapDiv {
    min-height: 100px;
    max-height: 1000px;
  }
</style>
```

# Step 4: Add a responsive map

```
<div class="container">
  <div id="mapDiv"></div>
</div>
...
<script src="http://js.arcgis.com/3.7compact"></script>
<script>
  <!-- Load Bootstrap Map - responsive map -->
  require(["esri/map",
    "../../src/js/bootstrapmap.js",
    "dojo/domReady!"],
    function(Map, BootstrapMap) {
      <!-- Get a reference to the ArcGIS Map -->
      var map = BootstrapMap.create("mapDiv",{
        basemap:"national-geographic",
        center:[-122.45,37.77],
        zoom:12
      });
    });
</script>
```

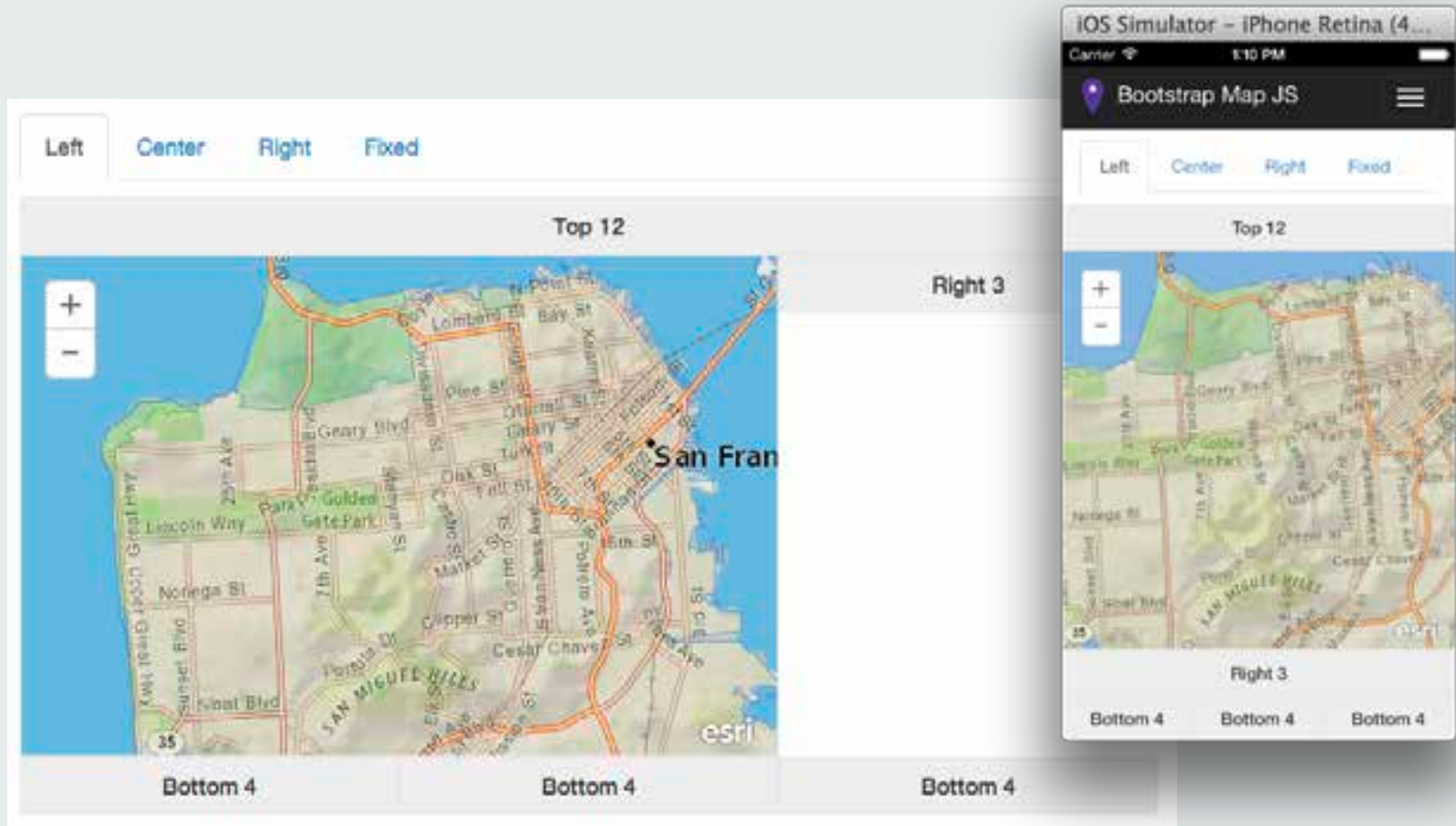
# Step 4: Add a responsive map

```
<div class="container">
  <div id="mapDiv"></div>
</div>
...
<script src="http://js.arcgis.com/3.7compact"></script>
<script>
  <!-- Load Bootstrap Map - responsive map -->
  require(["esri/map",
    "../src/js/bootstrapmap.js",
    "dojo/domReady!"],
  function(Map, BootstrapMap) {
    <!-- Get a reference to the ArcGIS Map -->
    var map = BootstrapMap.create("mapDiv",{
      basemap:"national-geographic",
      center:[-122.45,37.77],
      zoom:12
    });
  });
</script>
```

**A quick look inside...**



# Bootstrap Fluid Grid CSS



# Bootstrap Fluid Grid CSS

	<b>Extra small devices</b> Phones (<768px)	<b>Small devices</b> Tablets (≥768px)	<b>Medium devices</b> Desktops (≥992px)	<b>Large devices</b> Desktops (≥1200px)
<b>Grid behavior</b>	Horizontal at all times	Collapsed to start, horizontal above breakpoints		
<b>Container width</b>	None (auto)	750px	970px	1170px
<b>Class prefix</b>	<code>.col-xs-</code>	<code>.col-sm-</code>	<code>.col-md-</code>	<code>.col-lg-</code>
<b># of columns</b>	12			
<b>Column width</b>	Auto	60px	78px	95px

# Bootstrap Fluid Grid CSS

```
<div class="col-xs-12 col-sm-8">
```

**Define Column**



**Device Size**

**Number of  
Columns**



# Dynamic column widths

```
<div class="row">
  <div class="col-xs-12 col-sm-12 col-lg-12">
    <h5>Top 12</h5>
  </div>
</div>
<div class="row">
  <div class="col-xs-12 col-sm-8 col-lg-9">
    <!-- Bootstrap-map-js -->
    <div id="mapDiv1"></div>
  </div>
  <div class="col-xs-12 col-sm-4 col-lg-3">
    <h5>Right 3</h5>
  </div>
</div>
<div class="row">
  <div class="col-xs-4"><h5>Bottom 4</h5></div>
  <div class="col-xs-4"><h5>Bottom 4</h5></div>
  <div class="col-xs-4"><h5>Bottom 4</h5></div>
</div> >
```

# Map: Scroll without pan

```
// Set touch behavior
createMap: function() {
    var options = {smartNavigation:false};
    var map = new Map(mapDiv,options);
    map.on('load', this.setTouchBehavior);
    return map;
},

setTouchBehavior: function() {
    this.disableScrollWheelZoom();
},
```

# Map: Auto-resizing

```
// Responsive resize
var resizeWin function() {
    var w = window.innerWidth;
    if (w != this._w) {
        this._w = w;
        var b = document.body.clientHeight;
        var mh = this._mapDiv.clientHeight;
        var ms = this._calcSpace(this._map);
        var mh1 = mh - ms;
        var room = w - b;
        var mh2 = room + mh1;
        style.set(this._mapDivId, {
            "height": mh2+"px"});
    }
}

on(window, "resize", lang.hitch(this, resizeWin));
```

# Map: Auto-recentering

```
// Auto-center map
var recenter = function(extent, width, height) {
    this._map.__resizeCenter =
        this._map.extent.getCenter();
    var timer = function() {
        this._map.centerAt(this._map.__resizeCenter);
    }

    setTimeout(lang.hitch(this, timer), this._delay);
}

on(window, "resize", lang.hitch(this, recenter));
```



# Popups: Smart touch



```
// Smart-center popup
var updatePopup = function(obj) {
  var infoW = obj._map.infoWindow;
  updateTitle(infoW);
  obj._repositionInfoWin(infoW.features[0]);
}
```

```
on(this._map.graphics, "click", lang.hitch(this,
  function(){
    updatePopup(this);
  }));
```

Tip: Listen for onTouchStart and onClick

# Other Tips and Tricks

§ Watch for `.container` CSS

§ Remove all `:hover` states

§ Listen for *onTouchStart* and *click* to avoid 300ms delay





dōjō

embedjs

# jQuery Mobile

Mimics native look, feel and behavior

Mimics native development patterns

Cross-platform

Use with PhoneGap and Titanium

# PhoneGap + jQuery



# Mimic Native

Missouri Department of Health & Senior Services

Jay Nixon, Governor  
Gail Vasterling, Acting Director

Search Health Search

Healthy Living Senior & Disability Services Licensing & Regulations Disaster & Emergency Planning Data & Statistics Online Services

### Local WIC Providers

Home > Healthy Living > Healthy Families > WIC > Local WIC Providers

- MOWINS
- WIC Updates
- WIC Foods
- Food Package Training Materials (2009)
- Breastfeeding, Fit WIC and Nutrition
- Resources & Publications
- Forms
- Data & Statistical Reports
- Training

- WIC Participant Eligibility
- Locations
- Policies and Procedures
- Related Links
- Frequently Asked Questions
- WIC Vendors Home
- WIC Families Home
- Non-Discrimination Statement
- WIC Clinic Posters **New!**
- 2014 State Plan **New!**

### Healthy Living

- Environmental Factors
- Chronic Diseases
- Communicable Diseases
- Healthy Families
- Organ/Tissue Donation and Registry
- Women, Infants & Children (WIC)
- Genetic Disease & Early Childhood
- Food Programs
- Wellness & Prevention
- Local Public Health Agencies

This page is intended for use by the staff of local WIC...

Desktop

gis.dhss.mo.gov/Website/mobileWIC/WIC.html

## Find WIC Services

- WIC offices and satellite
- Stores that accept WIC
- Enter a starting address
- Use my current location
- Change Search Distance

Current Location

1561 W 3rd Ave  
Broomfield, CO 80020

Location accurate within 24000 meters of the address listed. Last Updated: 11/1/2013 10:05:06 AM

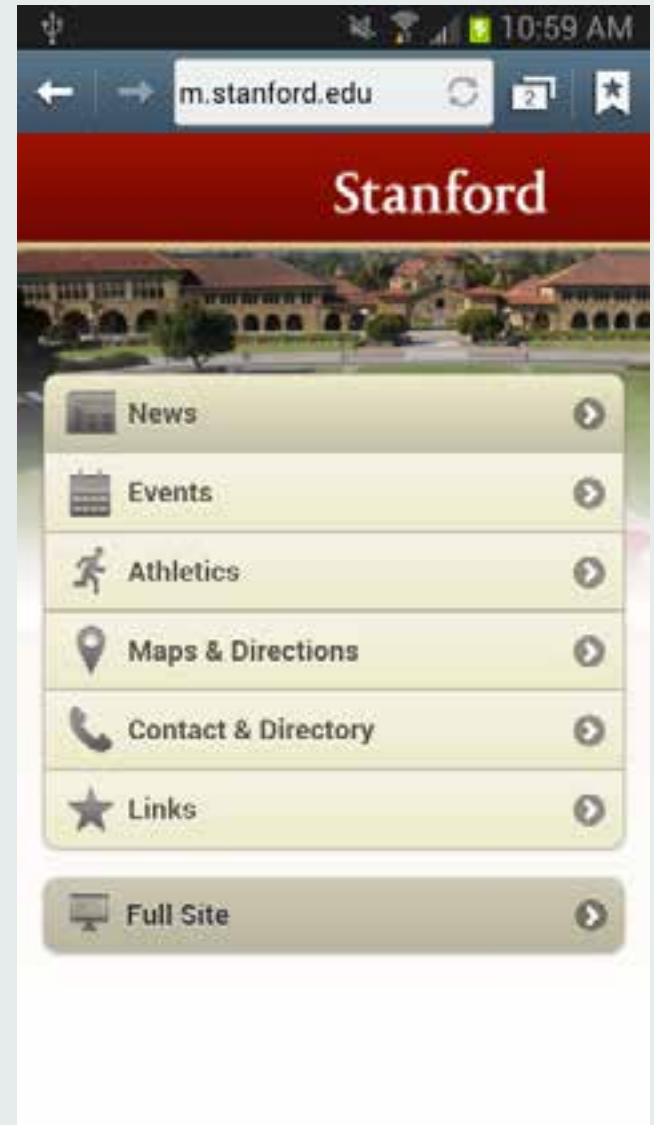
Missouri WIC Program

Phone

# Mimic Native



Desktop



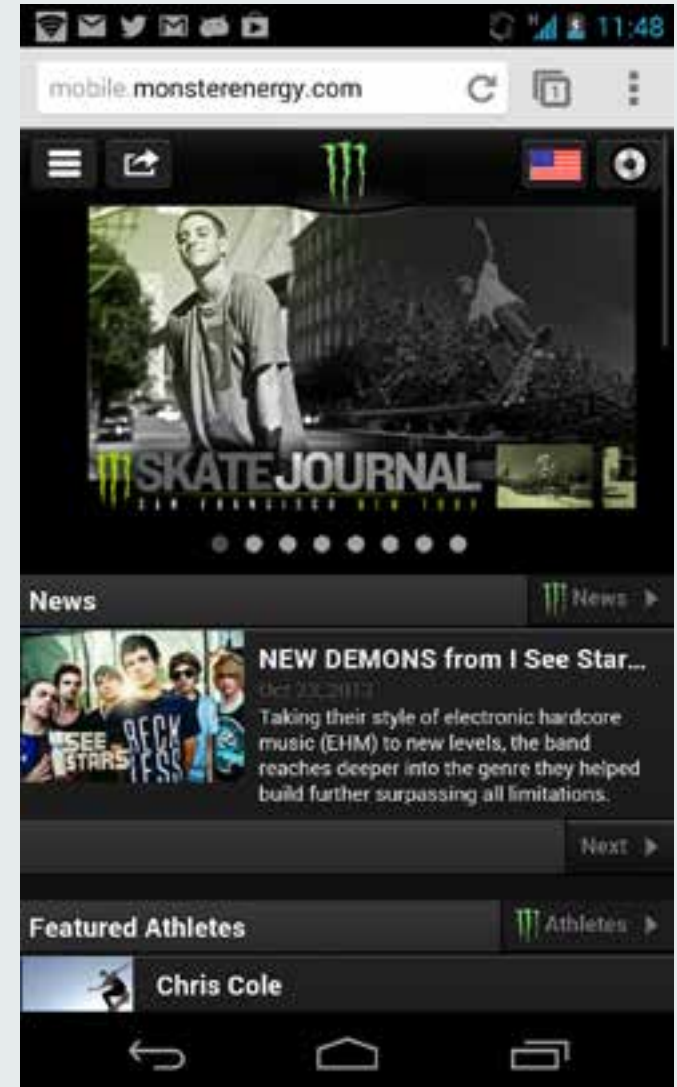
Phone



# Mimic Native

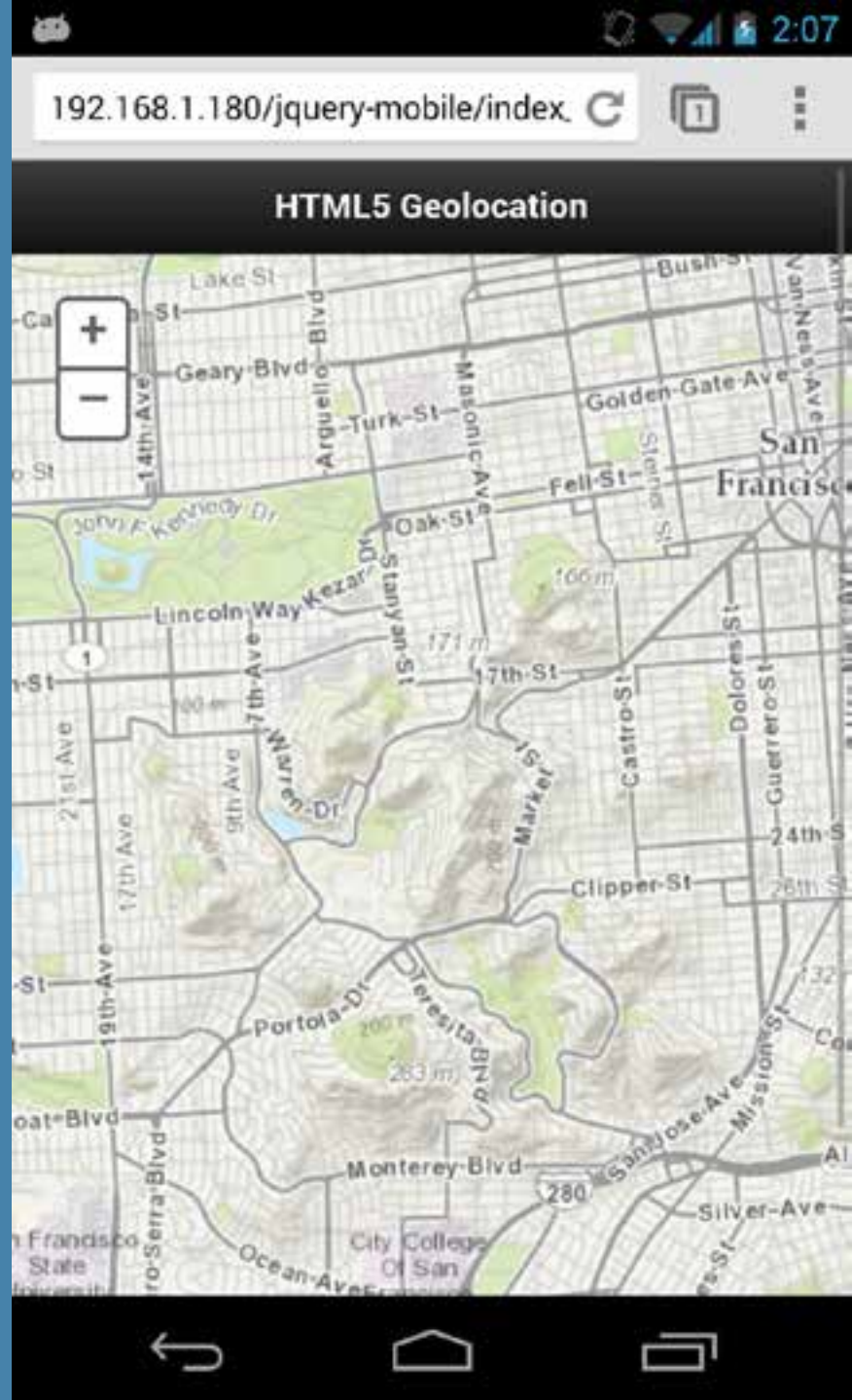


Desktop



Phone

# Single Page Map



# Single Page View

Page structure

Apply CSS, roles and themes

# Single Page Map - HTML

```
<div data-role="page" id="home">
```

```
//Header
```

```
<div data-theme="a" data-role="header"  
  data-position="fixed">
```

```
<h3>HTML5 Geolocation</h3>
```

```
</div>
```

```
//Map
```

```
<div data-role="content">
```

```
<div id="mapDiv"></div>
```

```
</div>
```

```
</div>
```

# Single Page Map - HTML

```
<div data-role="page" id="home">
```

```
//Header
```

```
<div data-theme="a" data-role="header"  
  data-position="fixed">
```

```
  <h3>HTML5 Geolocation</h3>
```

```
</div>
```

```
//Map
```

```
<div data-role="content">
```

```
  <div id="mapDiv"></div>
```

```
</div>
```

```
</div>
```

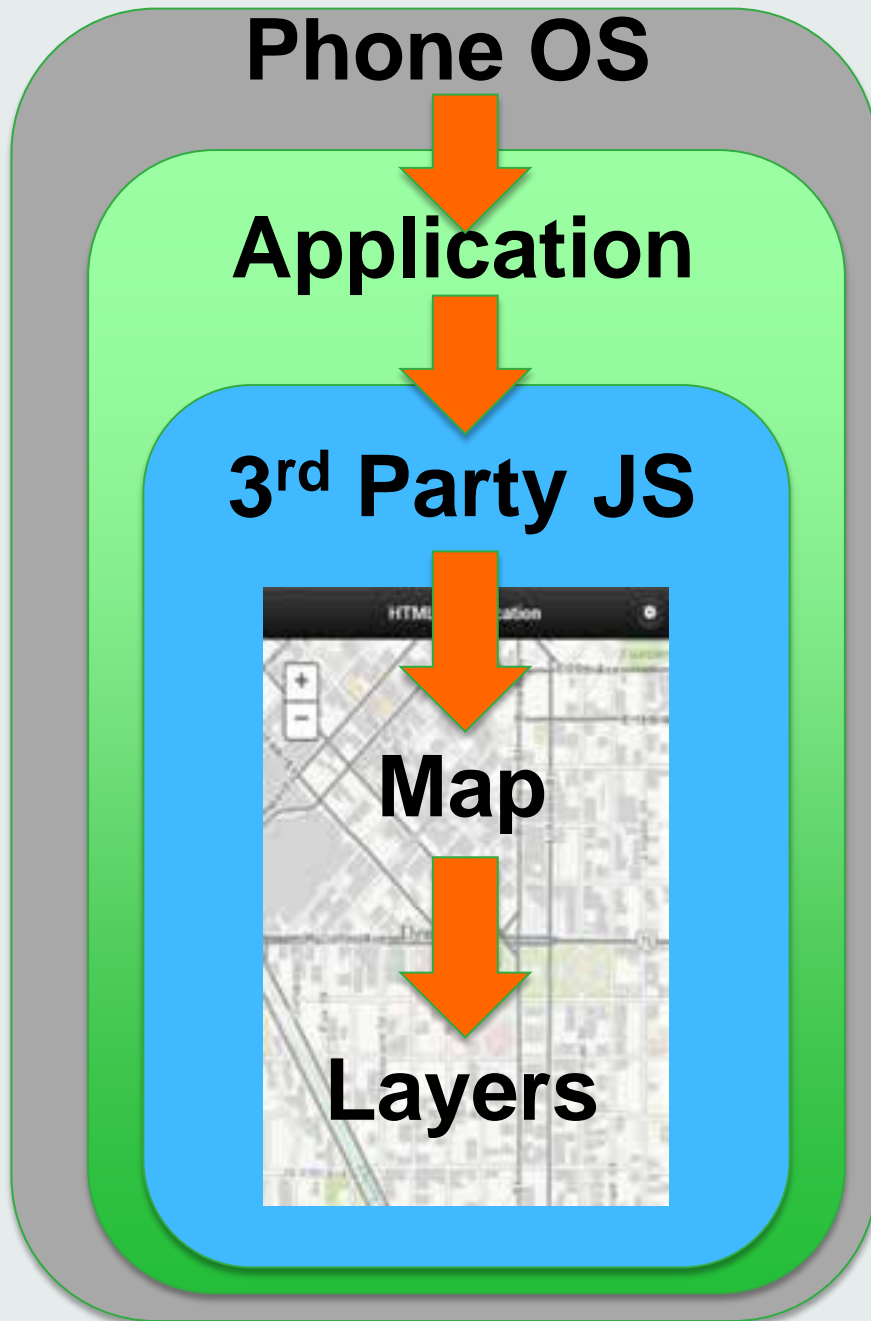
# Single Page Map - HTML

```
<div data-role="page" id="home">  
  //Header  
  <div data-theme="a" data-role="header"  
    data-position="fixed">  
    <h3>HTML5 Geolocation</h3>  
  </div>  
  
  //Map  
  <div data-role="content">  
    <div id="mapDiv"></div>  
  </div>  
</div>
```

# Single Page Map - CSS

```
html,body, div[data-role ="page"] {  
    height: 100%;  
    width: 100%;  
    margin: 0px;  
    padding: 0px;  
    overflow: hidden !important;  
}  
.ui-header{  
    margin: 0px !important;  
    padding: 0px !important;  
    float: left;  
}  
.ui-content{  
    height: 100%;  
    width: 100%;  
    margin: 0px;  
    padding: 0px;  
}  
#mapDiv {  
    position: absolute;  
    background-color: #EEEEDD;  
    height: 100%;  
    width: 100%;  
    padding: 0px;  
    z-index: 0;  
    left: 0px;  
}
```

# Lifecycle





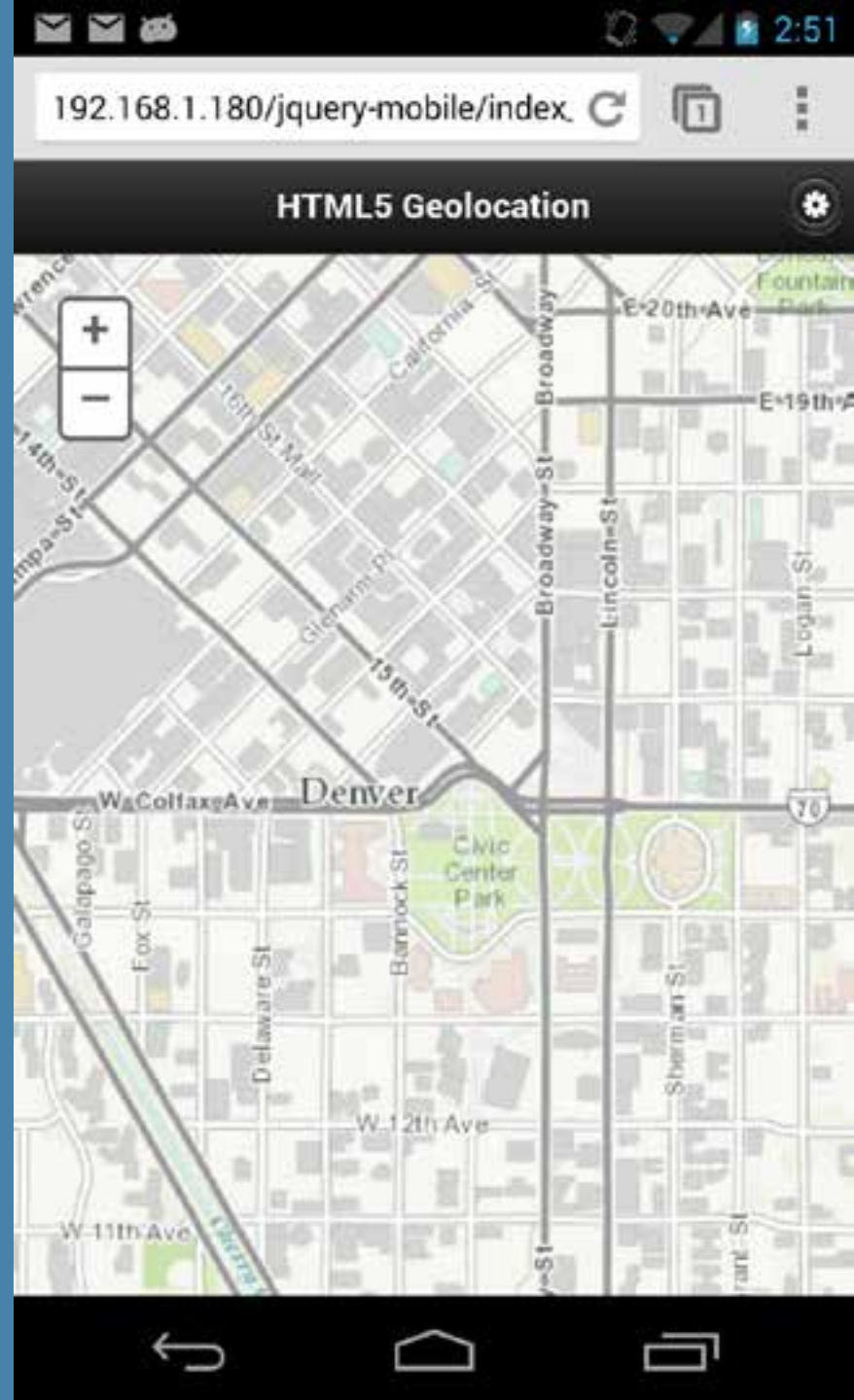
# App Life Cycle

1. Load CSS
2. Load jQuery
3. Load jQuery Mobile
4. Load HTML
5. Load ArcGIS API for JavaScript

# Map Life Cycle

1. jQuery “pageinit” event
2. ArcGIS JS API - dom/domReady!
3. Instantiate the Map
4. On map “load” event
5. Add additional layers or start GPS

# Multiple Page App



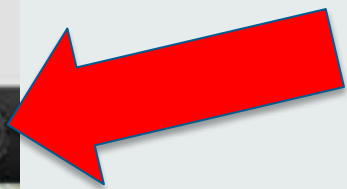
# Multi Page View

Set up additional pages

Set up page navigation

Additional CSS

# HTML5 Geolocation



Back

Geolocation:



# Multiple Page app – Page 2 HTML

```
<div data-role="page" id="settings" data-icon="home">
  //Our Header
  <div data-theme="a" data-role="header"
    data-position="fixed">
    <h1>Settings</h1>
  </div>

  //Page Content
  <div data-role="content">
    <div class="settings" style="margin-top: 15px;">
      <div>Geolocation:</div>
      <select name="slider" id="slider-geo-on-off"
        data-role="slider" data-theme="a">
        <option value="off">Off</option>
        <option value="on" selected>On</option>
      </select>
    </div>
  </div>
</div>
```

# Multiple Page app – Page 2 HTML

```
<div data-role="page" id="settings" data-icon="home">
  //Our Header
  <div data-theme="a" data-role="header"
    data-position="fixed">
    <h1>Settings</h1>
  </div>

  //Page Content
  <div data-role="content">
    <div class="settings" style="margin-top: 15px;">
      <div>Geolocation:</div>
      <select name="slider" id="slider-geo-on-off"
        data-role="slider" data-theme="a">
        <option value="off">Off</option>
        <option value="on" selected>On</option>
      </select>
    </div>
  </div>
</div>
```



# Multiple Page app – Page 2 HTML

```
<div data-role="page" id="settings" data-icon="home">  
  //Our Header  
  <div data-theme="a" data-role="header"  
    data-position="fixed">  
    <h1>Settings</h1>  
  </div>  
  
  //Page Content  
  <div data-role="content">  
    <div class="settings" style="margin-top: 15px;">  
      <div>Geolocation:</div>  
      <select name="slider" id="slider-geo-on-off"  
        data-role="slider" data-theme="a">  
        <option value="off">Off</option>  
        <option value="on" selected>On</option>  
      </select>  
    </div>  
  </div>  
</div>
```

# Multiple Page app – Page 2 HTML

```
<div data-role="page" id="settings" data-icon="home">
  //Our Header
  <div data-theme="a" data-role="header"
    data-position="fixed">
    <h1>Settings</h1>
  </div>

  //Page Content
  <div data-role="content">
    <div class="settings" style="margin-top: 15px;">
      <div>Geolocation:</div>
      <select name="slider" id="slider-geo-on-off"
        data-role="slider" data-theme="a">
        <option value="off">Off</option>
        <option value="on" selected>On</option>
      </select>
    </div>
  </div>
</div>
```

# Multiple Page app – Page 2 CSS

```
<style type="text/css">  
  /* Class for aligning buttons */  
  .settings{  
    margin-left: auto;  
    margin-right: auto;  
    text-align: center;  
    width: 100%;  
  }  
</style>
```

# Page Transitions & Orientation Change

Page and orientation life cycle

Map destruction & resizing

# Page Transitions

Page 1



Page 2



~250 ms

**HTML/CSS**

**jQuery**

**ArcGIS API  
for JavaScript**

**animation**

**< Back**

**Settings**

**Geolocation:**

**On**



# **Events:** entering page

pagebeforeshow

pageshow

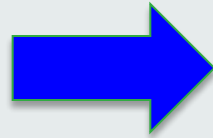
pagechangefailed

# Page Transitions & Orientation Change

**Page 1**

**Page 2**

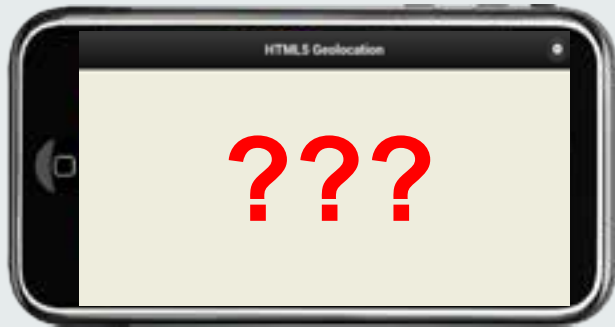
**Page 2**



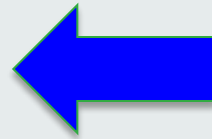


# Page Transitions & Orientation Change

Page 1



Page 2

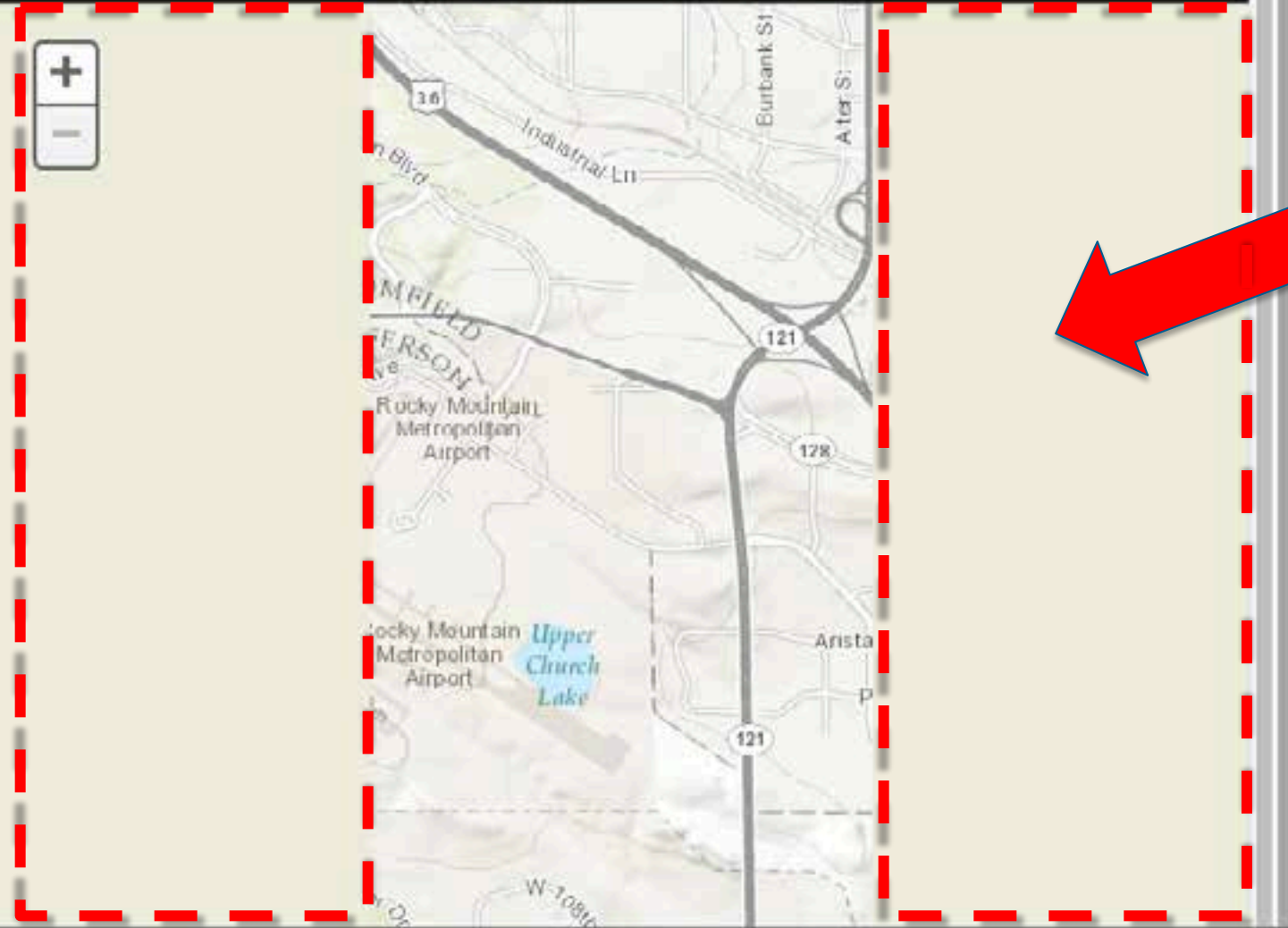


# HTML5 Geolocation



```
x Elements Resources Network Sources Timeline Profiles Audits Console
XMLHttpRequest cannot load http://services.arcgisonline.com/ArcGIS/rest/info?f=json. Origin
  Resource interpreted as Script but transferred with MIME type text/plain: "http://service
  f=json&callback=doio.io.script.isonp doioToScript1. isonpCallback".
home showing
Error: Invalid value for <image> attribute x="NaN"
Error: Invalid value for <image> attribute y="NaN"
>
```

# HTML5 Geolocation



⌘ Elements Resources Network Sources Timeline Profiles Audits Console

```
⊗ XMLHttpRequest cannot load http://services.arcgisonline.com/ArcGIS/rest/info?f=json. Origin
  ▶ Resource interpreted as Script but transferred with MIME type text/plain: "http://service
  f=json&callback=doio.io.script.isonp doioToScript1. isonpCallback".
⊗ home showing
⊗ ▶ Error: Invalid value for <image> attribute x="NaN"
⊗ ▶ Error: Invalid value for <image> attribute y="NaN"
>
```

# Use jquery-mobile-map-js library!

```
var helper =  
    new jQueryHelper( map );
```

The following won't work for all use cases:

```
map.reposition();
```

```
map.resize();
```

# Use Case - Recenter the map



# Use jquery-mobile-map-js library!

```
var helper =  
    new jQueryHelper( map );
```

<http://github.com/esri/jquery-mobile-map-js>

# Auto-recenter after orientation change

```
//Listen for map load event
map.on("load",init);

function init(){
  try{
    helper = new jQueryHelper(map);
    helper.setCenterPt(x,y,4326);
  }
  catch(err) {
    console.log("jQueryHelper " + err.message);
  }

  //Some browsers don't show full height after onLoad
  map.reposition();
  map.resize();
}
```



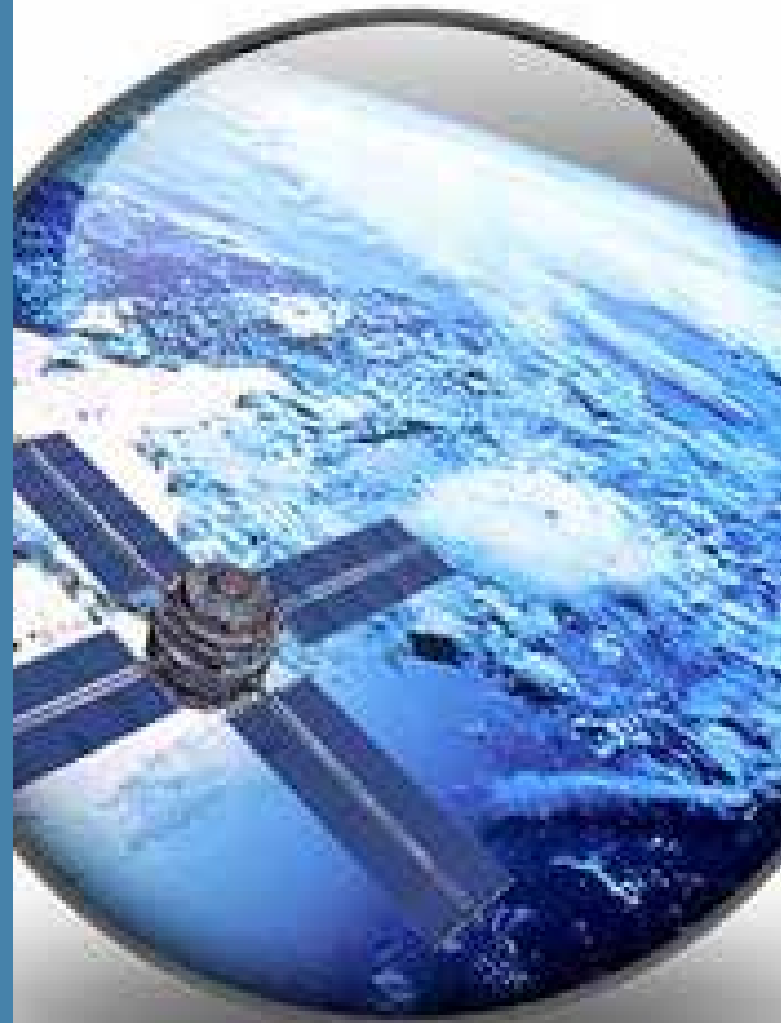
# Multiple page app – **Map** Life Cycle

Listen for “helper-map-loaded” event

```
//Custom event from jQueryHelper
$(document).on("helper-map-
loaded",function(evt){
    map = helper.map;

    if(geoEnabled == true) {
        startGeolocation();
    }
});
```

# Working with GPS



# Web GPS: Caveats

NOT as accurate as native

LESS control than native

Cannot be used when minimized

# Working with GPS

```
var mapLoaded = false;
navigator.geolocation.watchPosition(
    locationSuccess,
    locationError,
    {setHighAccuracy:true}
);
```

```
map.on("load",function(evt){
    mapLoaded = true;
});
```

```
function locationSuccess(evt){
    if(mapLoaded){ . . . }
}
```

# GPS Best Practices

When viewing non-map pages

- Do not write points to map
- Cache points in localStorage

# GPS Best Practices

When returning to map page

- “helper-map-loaded” event
- Turn GPS back on
- Recenter map
- Write cache points to map

# Responsive Wrap up

§ Single web app that works *well* across a variety of devices/screen sizes

§ Re-use content and software

§ Considers

§ Device limitations

§ User's behavior



# jQuery wrap up

Mimic native behavior

Gives more control over life cycle

Combined w/ PhoneGap on Google  
Play and App Store



# Addt'l Resources

[andygup.net/web-mobile](http://andygup.net/web-mobile)

[jquerymobile.com](http://jquerymobile.com)

[getbootstrap.com](http://getbootstrap.com)

# Questions?

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