Strategies for Building Mobile Apps Using ArcGIS API for JavaScript

Andy Gup, Lloyd Heberlie

Agenda

Mobile web has differences

5 Steps for building awesome mobile apps

Bootstrap

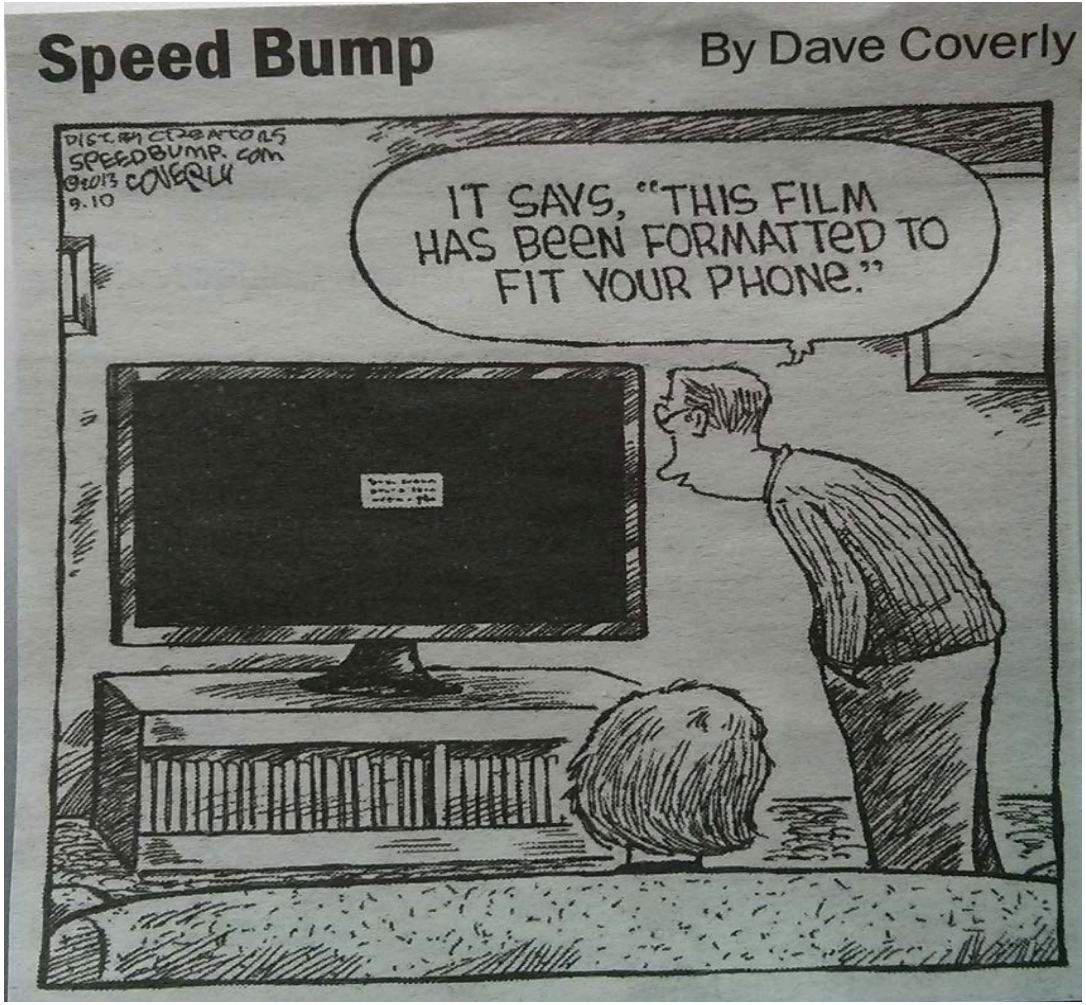
jQuery Mobile

Geolocation

Offline

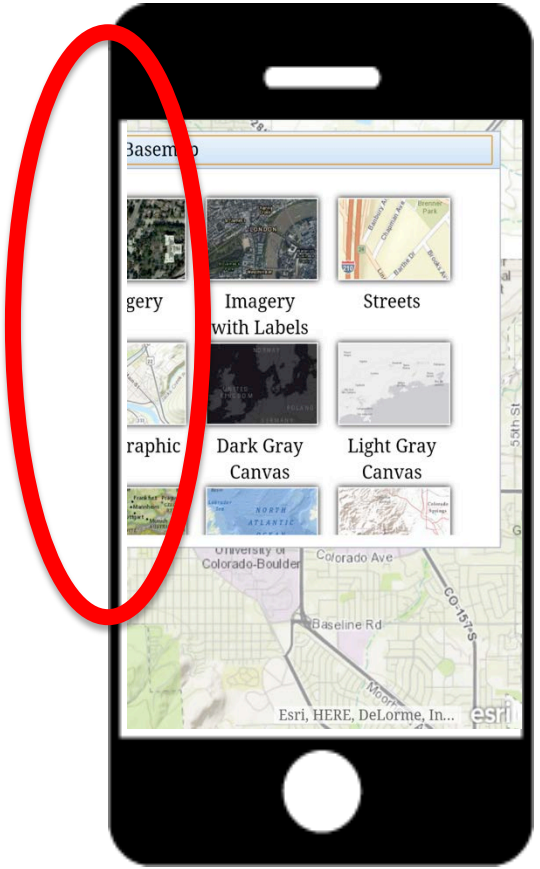
Speed Bump

By Dave Coverly

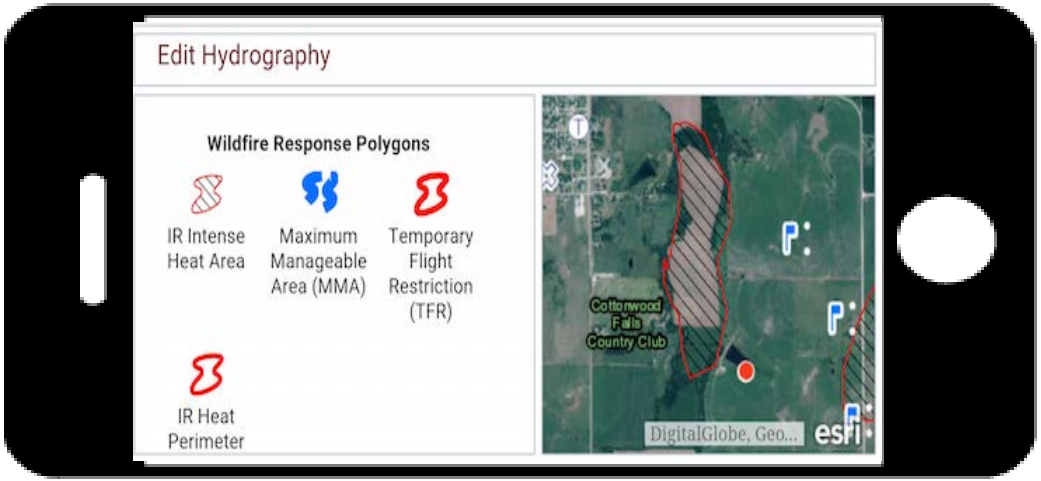


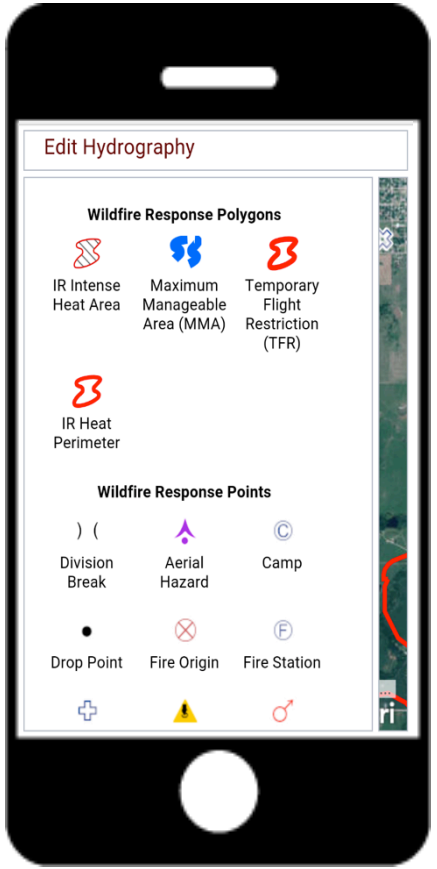
Default Behavior

Default Behavior

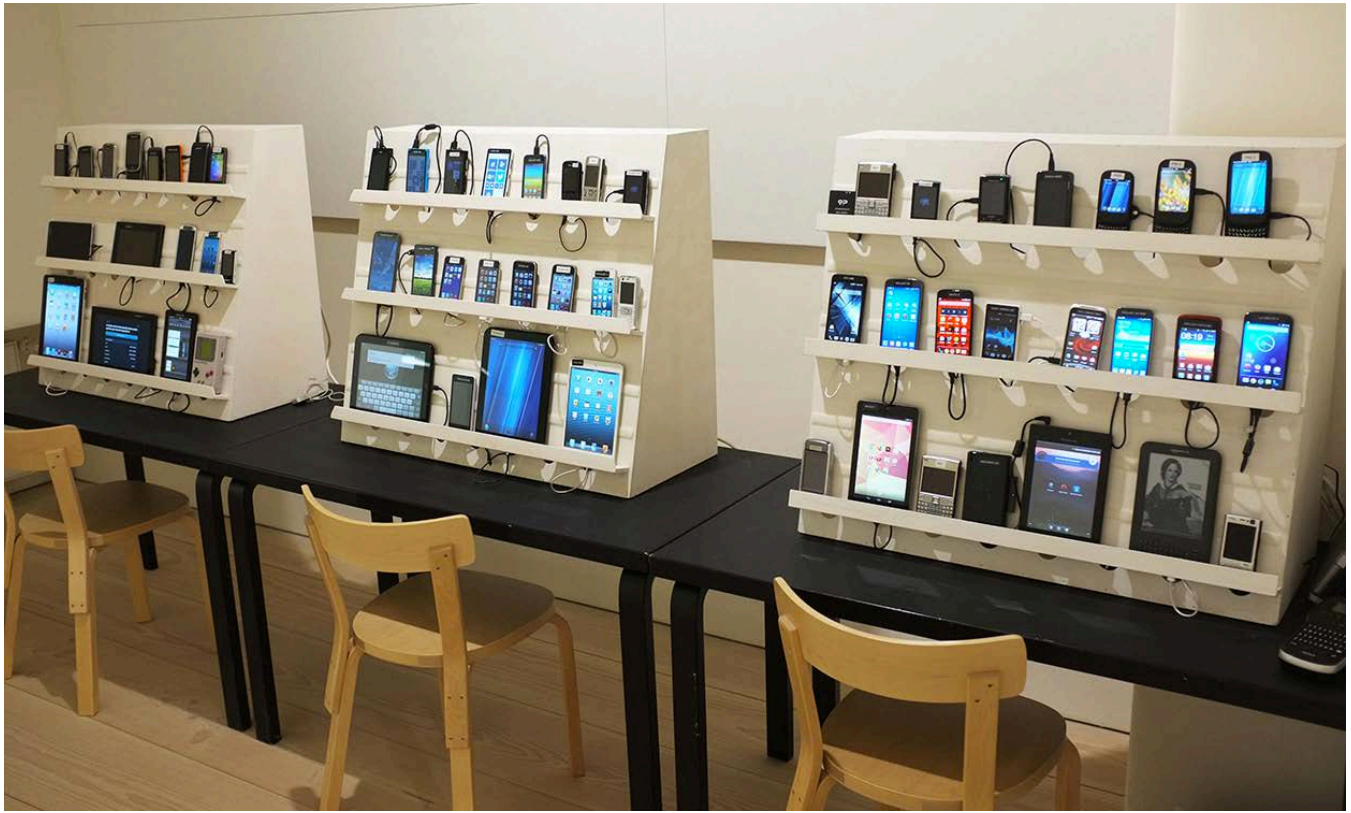


Default Behavior





Apps specifically built for mobile



Apps specifically built for mobile

Field data collection

Deploy to App Store, Google Play

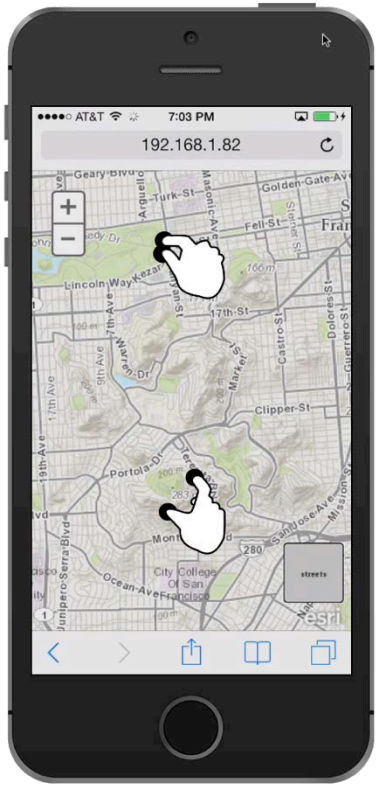
Citizen 411

Finder apps

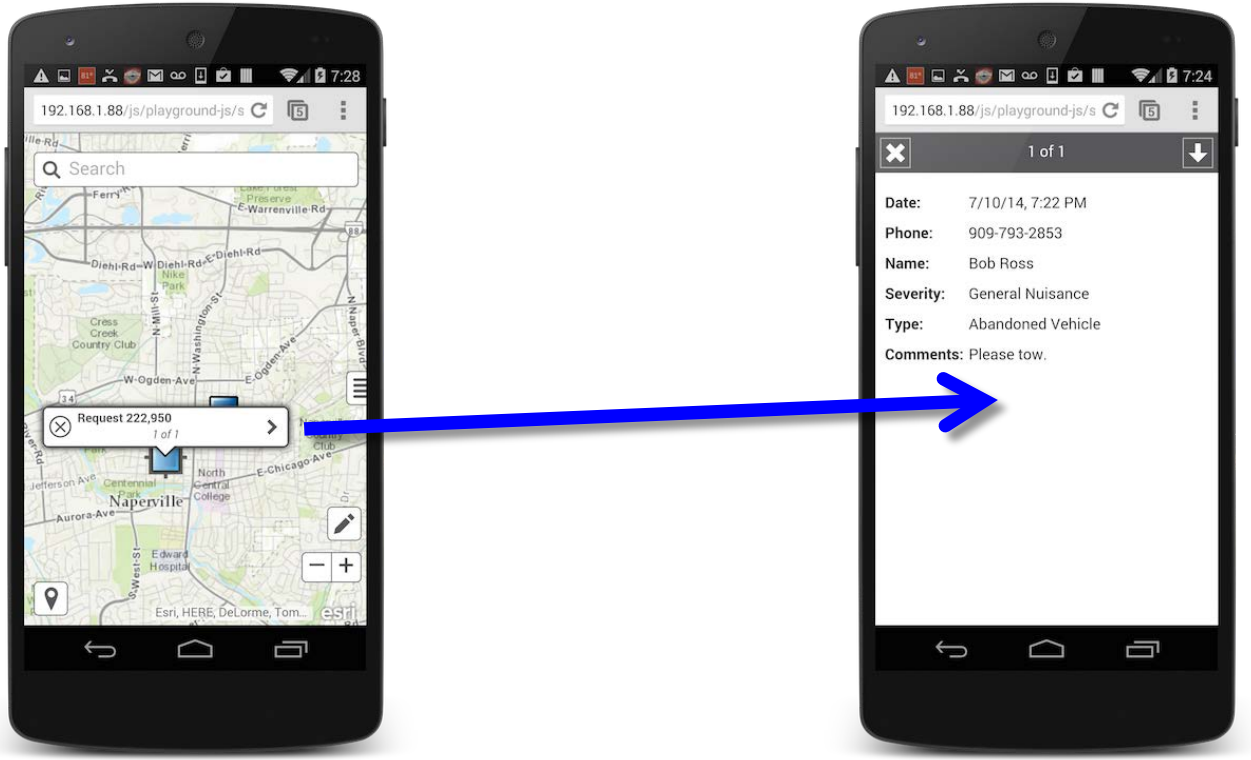
Offline maps

Demo

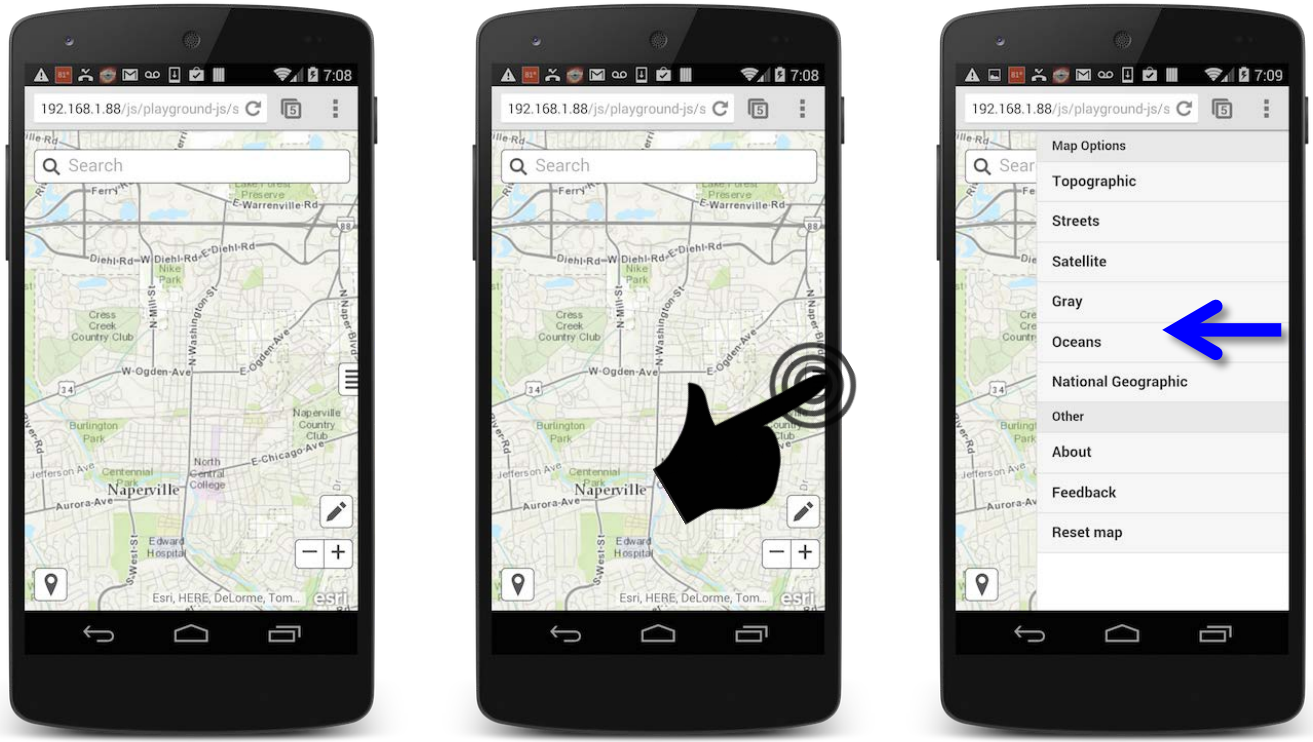
Touch-aware map



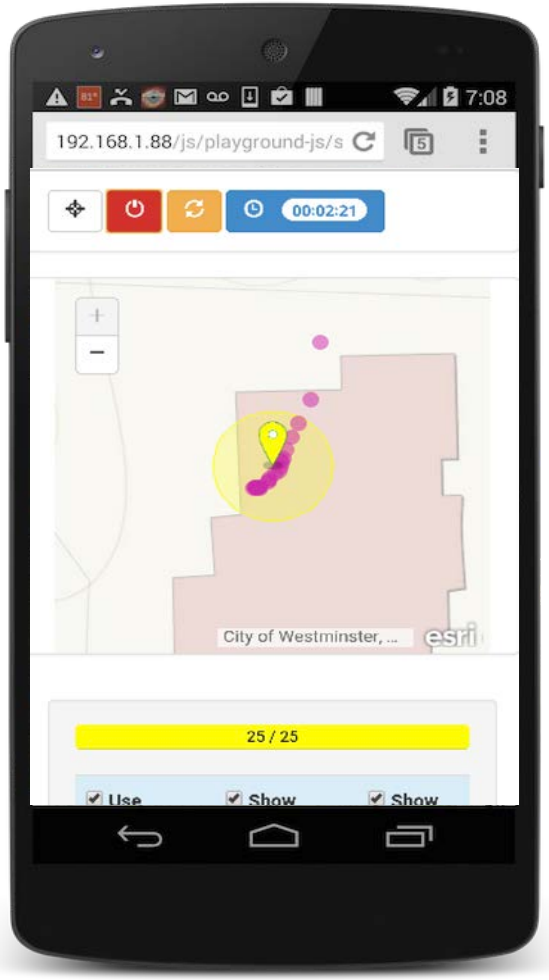
esri/dijit/PopupMobile



Custom basemap switcher



Geolocation



Mobile devices are different

Physical device

Screen size

Button sizes

User interactions are different

Touch

Orientation

Onscreen keyboard

Voice

Design pattern are different

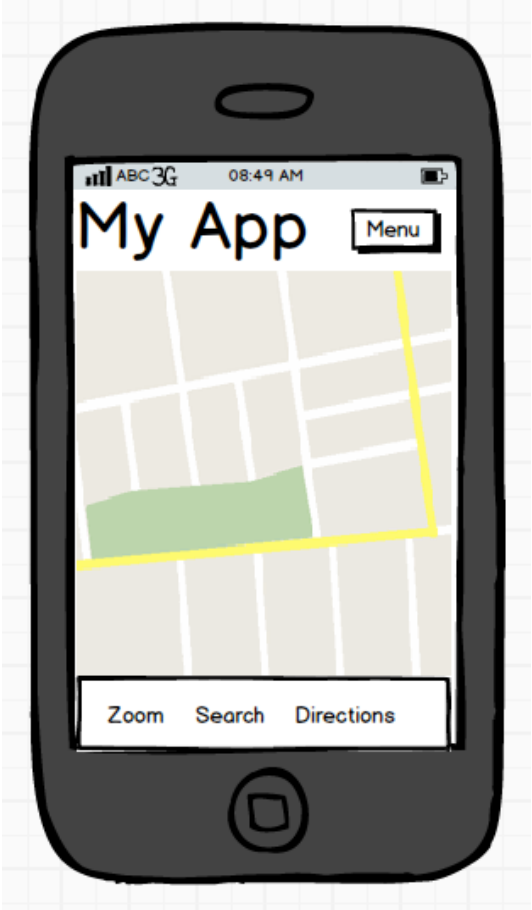
Fits smaller screens

Screen orientation can rotate

Mobile popups and overlays

Touch-based navigation

Think mobile first!

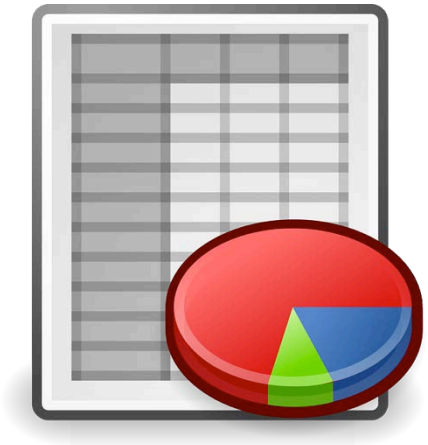


320px

Mobile in 5 Steps

STEP 1

Get your data in order



STEP 2

Sketch, mockup, UI design

STEP 3

Choose web, hybrid or native

STEP 4

Choose a UX framework

Single page, multiple page?

STEP 5

Iterate/Collaborate

Build > Test > Repeat

Step #1

Get your data in order

Get your data in order

Develop a schema

Design tables and relationships

Clean the data

Test, test, test

Mobile ready data?

Test query payload size

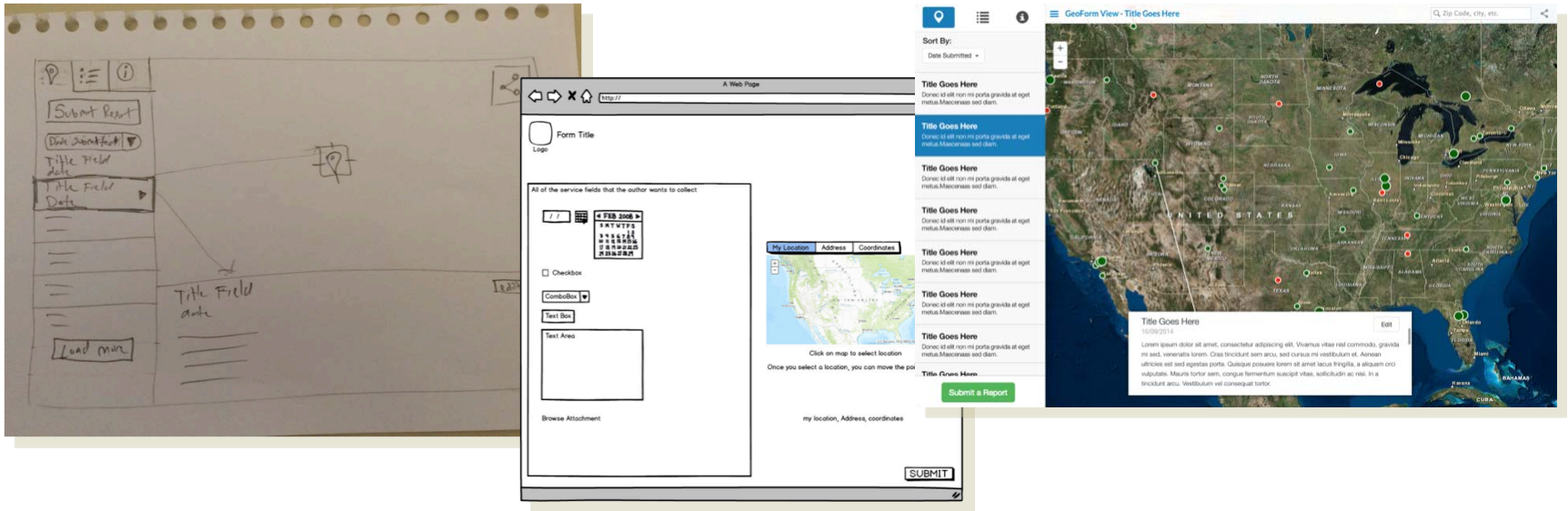
Simplify polygons!

Remove unneeded attributes

Gzip-enabled web server


Step #2
Sketch, mockup, design

Sketch, mockup, UI design



Sketch, mockup, UI design

Think mobile first

Simplified menus

Smaller map

Map primary or secondary?

Step #3

Web, hybrid or native?

Web, hybrid or native?

Native = Objective C, Java or C#

Compiled to run on device OS

Accesses device directly via native API

Web

JavaScript, CSS skills

Cross-browser, cross-device

No special access needed to sensors

No special storage needs

Web

Web = Browser-based only

HTML, CSS, JavaScript

Access device via browser APIs

Hybrid

Hybrid = Native Chrome-less browser plus HTML, CSS, JavaScript
Example: PhoneGap/Cordova

Compiled as a native application
Accesses device via browser APIs & plug-ins

Hybrid

JavaScript, CSS skills

Cross-browser, cross-device

Some special access needed to sensors

Some special storage needs

App Store and/or Google Play

Native

Native = Objective C, Java or C#

Compiled to run on device OS

Accesses device directly via native API

Native

Objective C, Java and/or C# skills

High-performance requirements

Special access needed to sensors

Special storage needs

Offline related tables, domains and subtypes

Native

Better memory management

Control over battery life

App Store and/or Google Play

Step #4

Choose a UI framework

Choose a UI framework

Single view

- Responsive design pattern

Multiple views

- Fixed layout design pattern

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

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

Fluid Grid System

- Layout adapts to different screen sizes
- Based on percentages
- 12 column / 960px

Demo

Bootstrap Fluid Grid

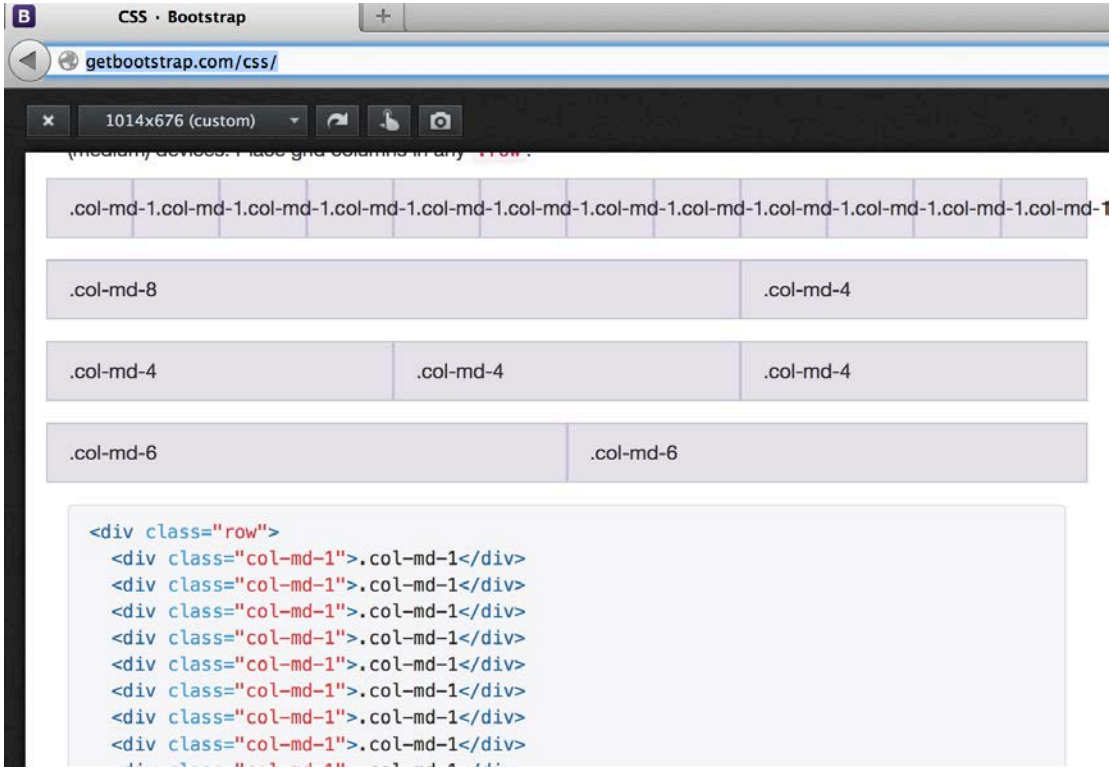
CSS Media Queries

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

CSS Media Queries

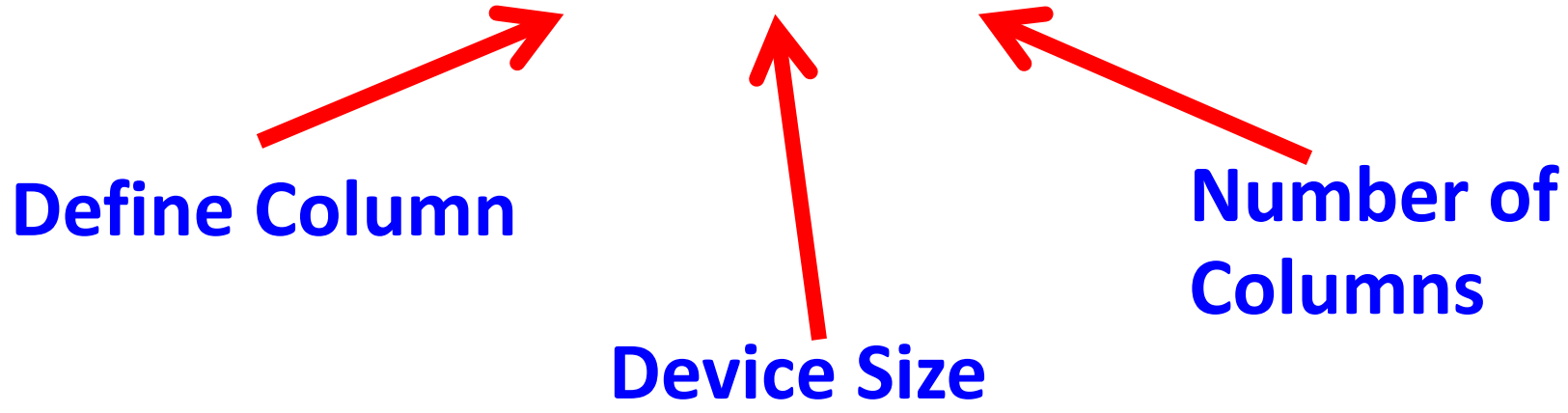
```
@media only screen and (max-device-width:480px) {

    /* Custom css styles */
    body {
        font-size: 0.5em;
    }

    #titleArea {
        display: none;
    }
}
```

http://getbootstrap.com/css/

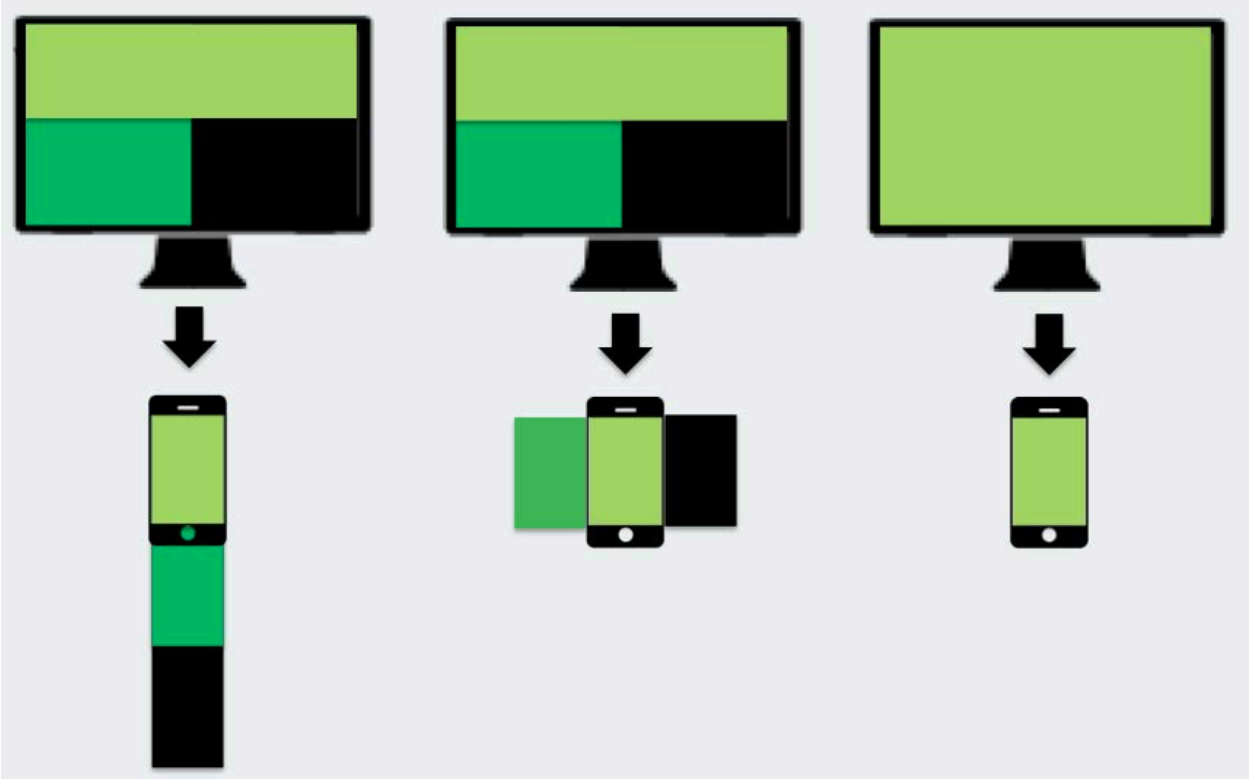


Bootstrap Fluid Grid CSS

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



Responsive Grid Layouts



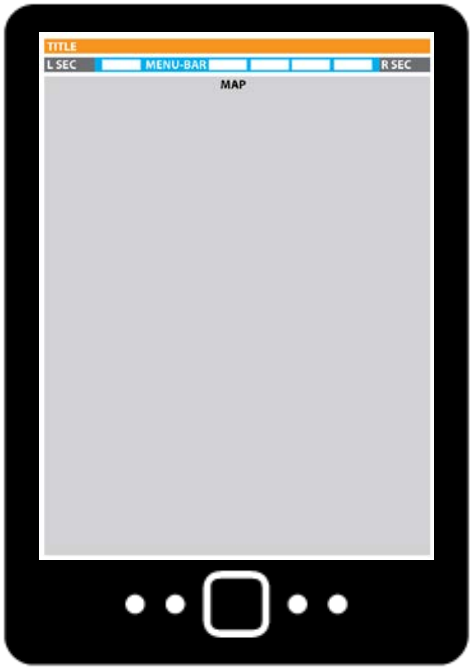
Large: 3 Rows - 3 Columns

>= 1280px

Medium: 2 Columns

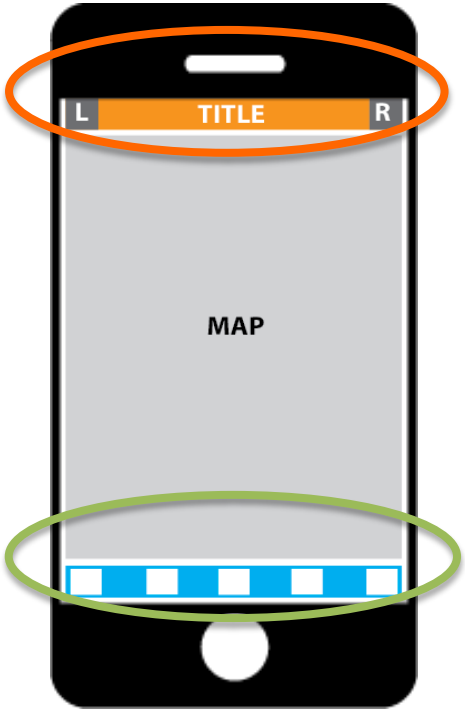
1024 - 1280px

Small: Single Column



768 - 1024px

Extra Small: 1 Column, Minimized



=< 768px

Responsive Application

How-to
Build a responsive app

Get bootstrap-map-js

github.com/Esri/bootstrap-map-js

Hello World

```
<!DOCTYPE html>
<html>
  <head>
    <title>Bootstrap 101 Template</title>
    <meta name="viewport" content="width=device-width,
          initial-scale=1.0, maximum-scale=1.0, user-scalable=no">
    <link rel="stylesheet" type="text/css"
          href="//js.arcgis.com/3.13/esri/css/esri.css">
    <link rel="stylesheet" type="text/css"
          href="https://esri.github.io/bootstrap-map-js/src/css/bootstrapmap.css">
    <style type="text/css">
      #mapDiv {
        min-height: 100px;
        max-height: 1000px;
      }
    </style>
  </head>
  <body>

    <div class="container">
      <div id="mapDiv">Hello World</div>
    </div>

  </body>
</html>
```

Add package path

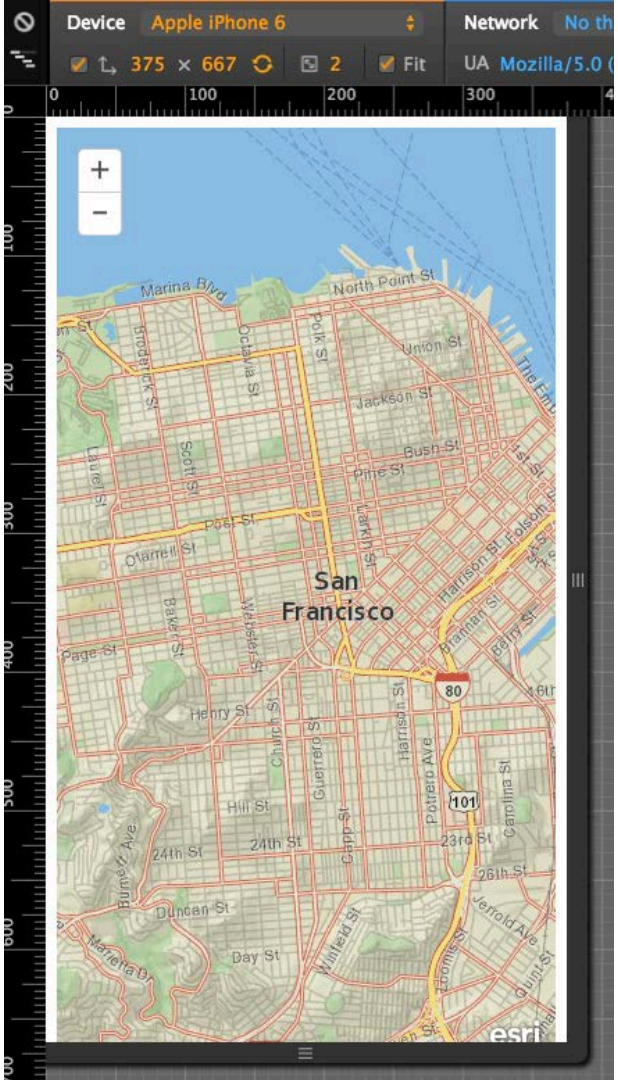
```
<script type="text/javascript">
    var package_path = "https://esri.github.io/bootstrap-map-js/src/js";
    var dojoConfig = {
        packages: [{
            name: "application",
            location: package_path
        }]
    };
</script>
```

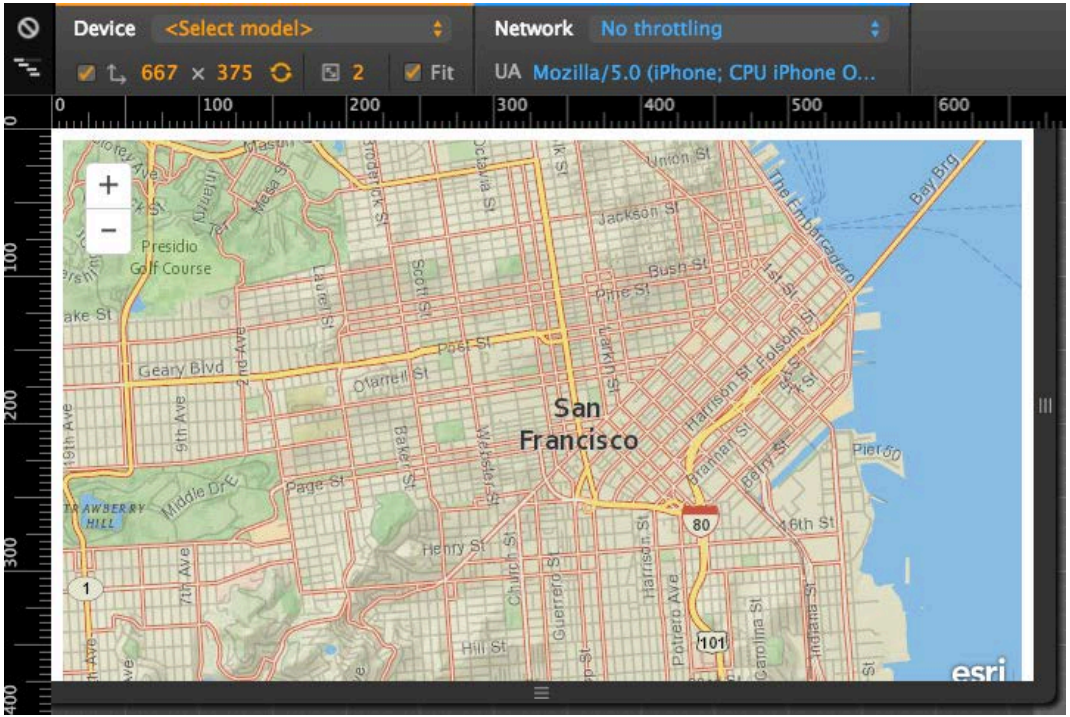
Add jQuery & bootstrap.js

```
<body>

  <div class="container">
    <div id="mapDiv"></div>
  </div>

  <script src="http://code.jquery.com/jquery-1.11.1.min.js"></script>
  <script src="//maxcdn.bootstrapcdn.com/bootstrap/3.3.2/js/bootstrap.min.js"></script>

</body>
```

Add JS API and BootstrapMap

```
<script src="https://js.arcgis.com/3.13compact"></script>
<script>
    require(["esri/map", "application/bootstrapmap"  "dojo/domReady!"],
            function(Map, BootstrapMap) {
                // Get a reference to the ArcGIS Map class
                var map = BootstrapMap.create("mapDiv",{
                    basemap:"national-geographic",
                    center:[-122.45,37.77],
                    zoom:12
                });
            });
</script>
```


Device
Apple iPhone 6
Network
375 × 667
2
Fit
UA Mozilla/5.0
San Francisco
esri


Device
<Select model>
Network
No throttling
667 × 375
2
Fit
UA Mozilla/5.0 (iPhone; CPU iPhone O...
San Francisco
esri

How-to
Build a Multiple-view app

Multiple-View Design

- Framework for single page apps with multiple views
- Similar to native look, feel and behavior
- Cross-browser

Desktop vs. Device

Missouri Department of
Health & Senior Services

Jay Nixon, Governor
Gail Vasterling, Acting Director

Search Health | Search

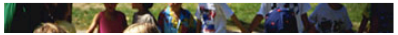
Healthy Living | Senior & Disability Services | Licensing & Regulations | Disaster & Emergency Planning | Data & Statistics | Online Services

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!

This page is intended for use by the staff of local WIC provider agencies. If you are a WIC



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

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

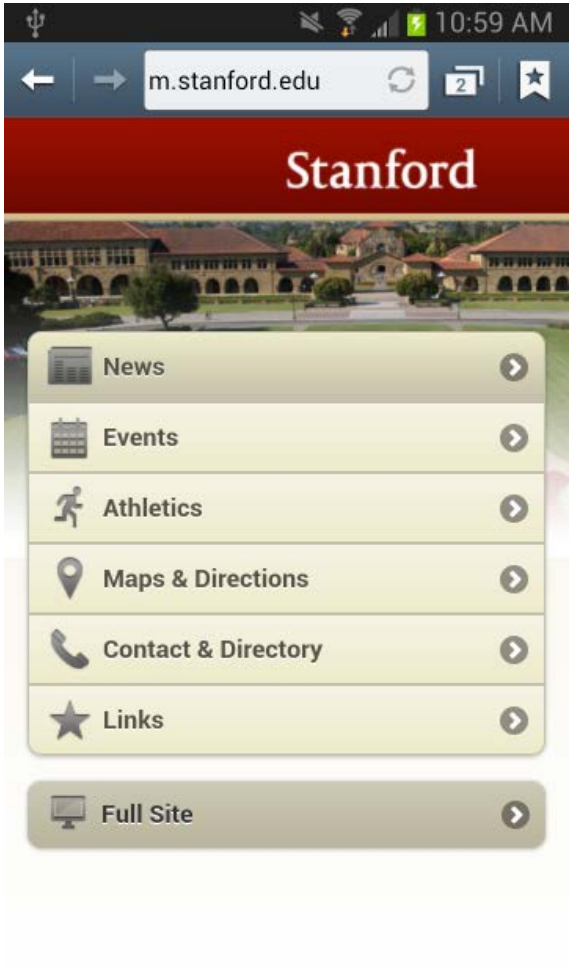
Current Location

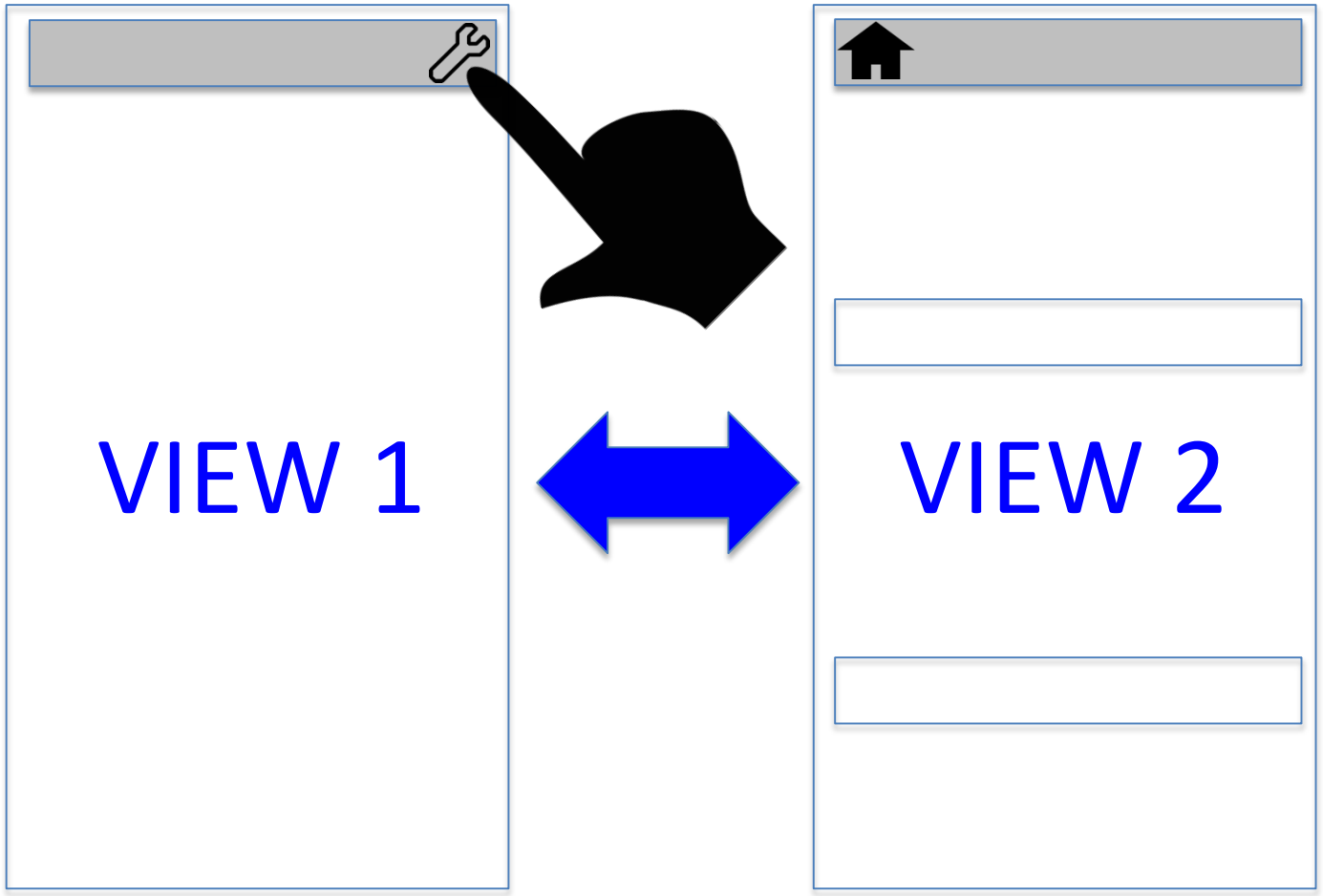
1561 W 3rd Ave
Broomfield, CO 80020

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

Missouri WIC Program

Desktop vs. Device

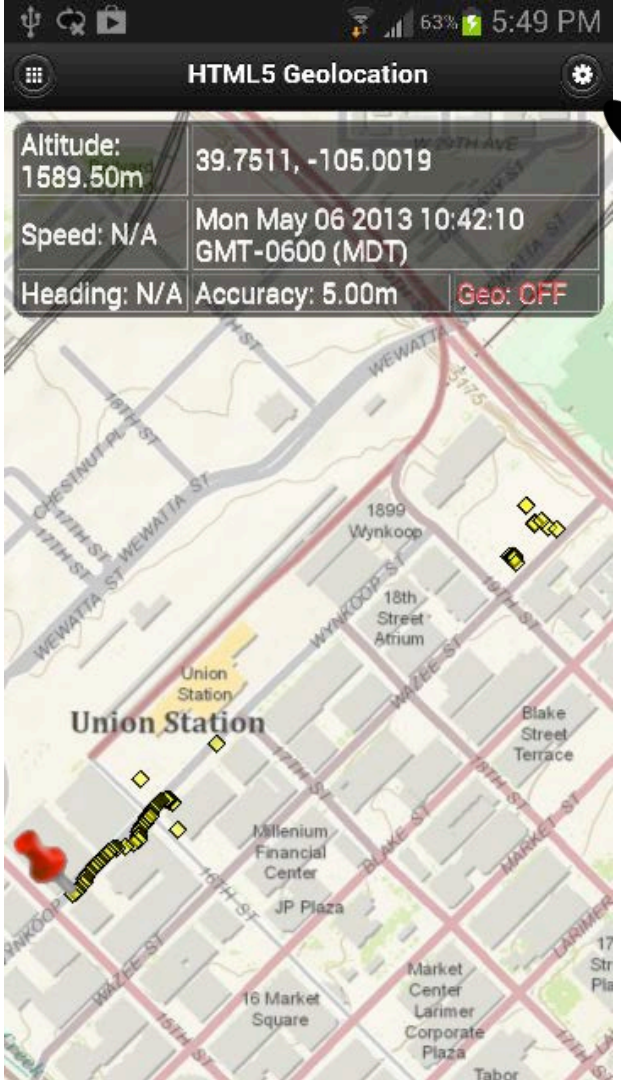


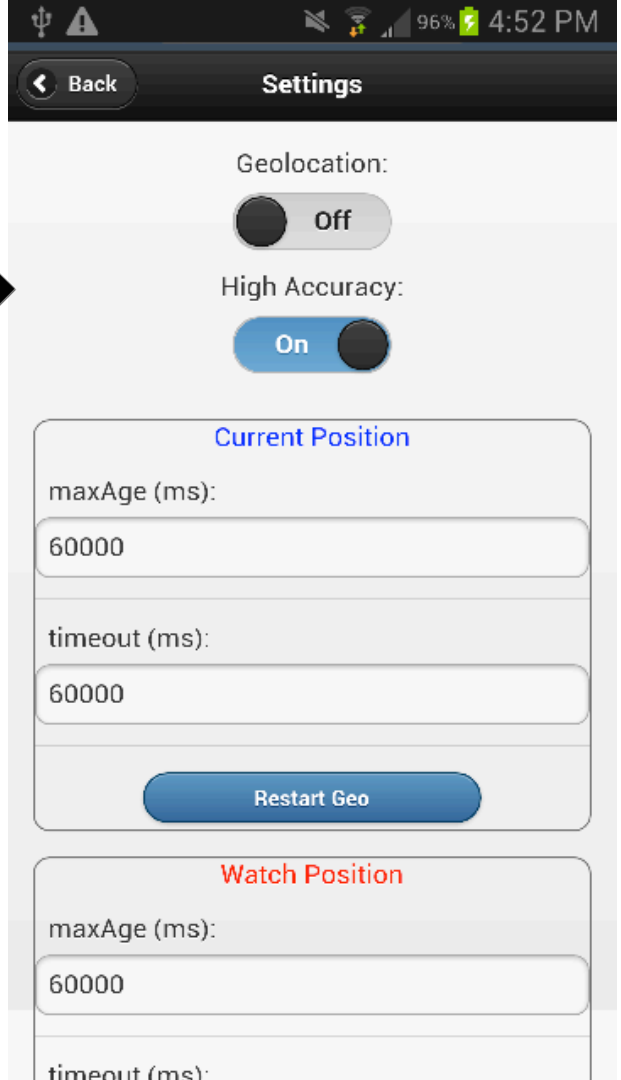

VIEW 1
VIEW 2

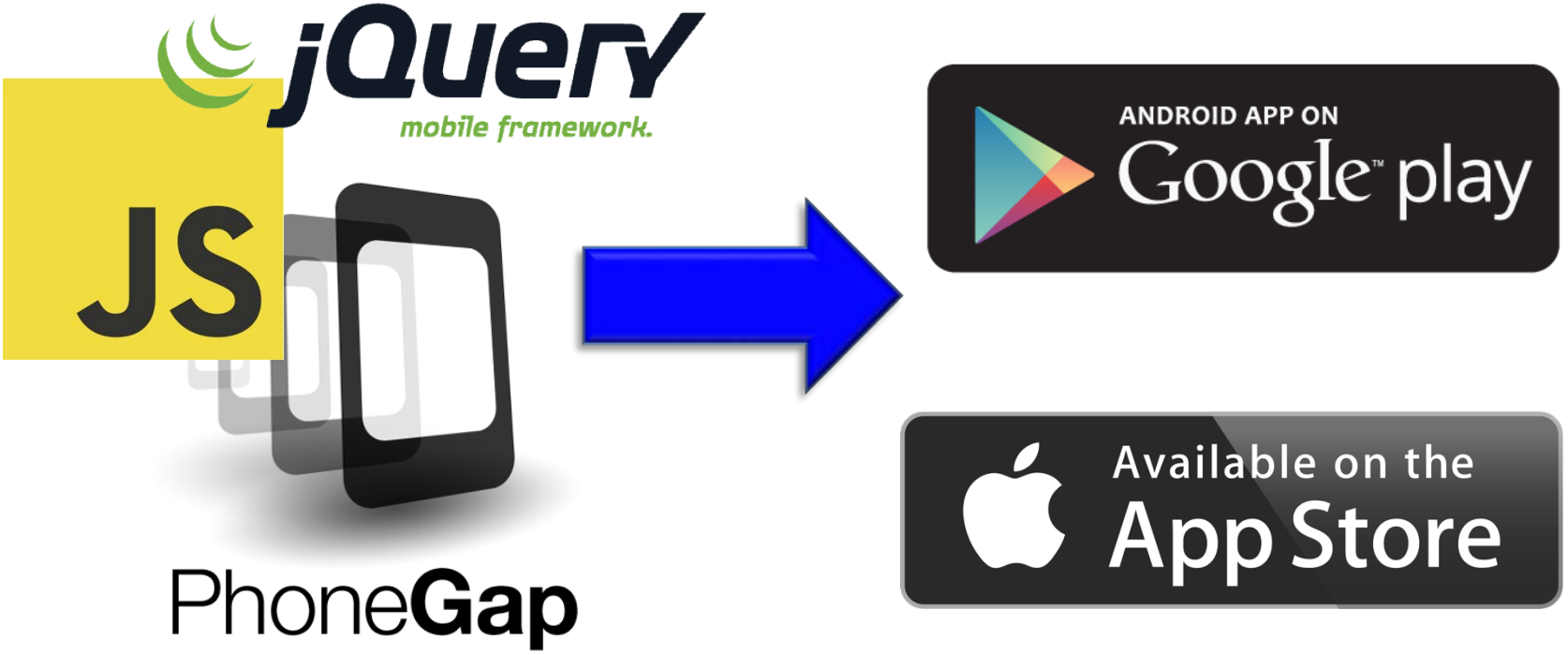
One HTML page

Multiple Views

```
<html>

    <div data-role="page" id="page1">


    </div>

    <div data-role="page" id="page2">


    </div>



</html>
```


63% 5:49 PM
HTML5 Geolocation
Altitude: 1589.50m
39.7511, -105.0019
Speed: N/A
Mon May 06 2013 10:42:10 GMT-0600 (MDT)
Heading: N/A
Accuracy: 5.00m
Geo: OFF
Union Station
1899 Wynkoop
18th Street Atrium
Blake Street Terrace
Millenium Financial Center
JP Plaza
16 Market Square
Market Center Larimer Corporate Plaza


96% 4:52 PM
Back
Settings
Geolocation:
Off
High Accuracy:
On
Current Position
maxAge (ms):
60000
timeout (ms):
60000
Restart Geo
Watch Position
maxAge (ms):
60000
timeout (ms):


jQuery
mobile framework.
JS
PhoneGap
ANDROID APP ON
Google play
Available on the
App Store

Get jquery-mobile-map-js

https://github.com/Esri/jquery-mobile-map-js

Add Some CSS

```
<meta http-equiv="Content-Type" content="text/html; charset=utf-8">
<meta name="viewport" content="initial-scale=1, maximum-scale=1,user-scalable=no"/>

<title>Two Page jQuery Mobile Map</title>

<link rel="stylesheet" type="text/css" href="css/themes/black-theme.min.css"/>
<link rel="stylesheet" type="text/css" href="css/themes/jquery.mobile.icons.min.css"/>
<link rel="stylesheet" href="//js.arcgis.com/3.13/esri/css/esri.css">
<link rel="stylesheet" href="//code.jquery.com/mobile/1.4.0/jquery.mobile-1.4.0.min.css" />
```

Add a little more CSS

```
<style type="text/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;
    }
    .settings{
        margin-left: auto;
        margin-right: auto;
        text-align:center;
        width: 100%;
    }
    #mapDiv {
        position: absolute;
        background-color: #EEEEDD;
        height: 100%;
        width: 100%;
        padding: 0px;
        z-index: 0;
        left: 0px;
    }
</style>
```

Add 2 pages

```
<div data-role="page" id="home">
    <div data-theme="b" data-role="header" data-position="fixed">
        <h3>Map!</h3>
        <a href="#settings" data-role="button" data-transition="slide"
           data-icon="gear" class="ui-btn-right" data-iconpos="notext">Settings</a>
    </div>
    <div data-role="content">
        <div id="mapDiv"></div>
    </div>
</div>
<div data-role="page" id="settings">
    <div data-role="header" data-theme="b" data-position="fixed">
        <h1>Settings</h1>
        <a href="#home" data-role="button" data-rel="back"
           data-icon="home" class="ui-btn-icon-left" data-iconpos="notext"></a>
    </div>
    <div data-role="content">
          Hello - This is just a placeholder
    </div>
</div>
```

Add jQuery & bootstrap.js

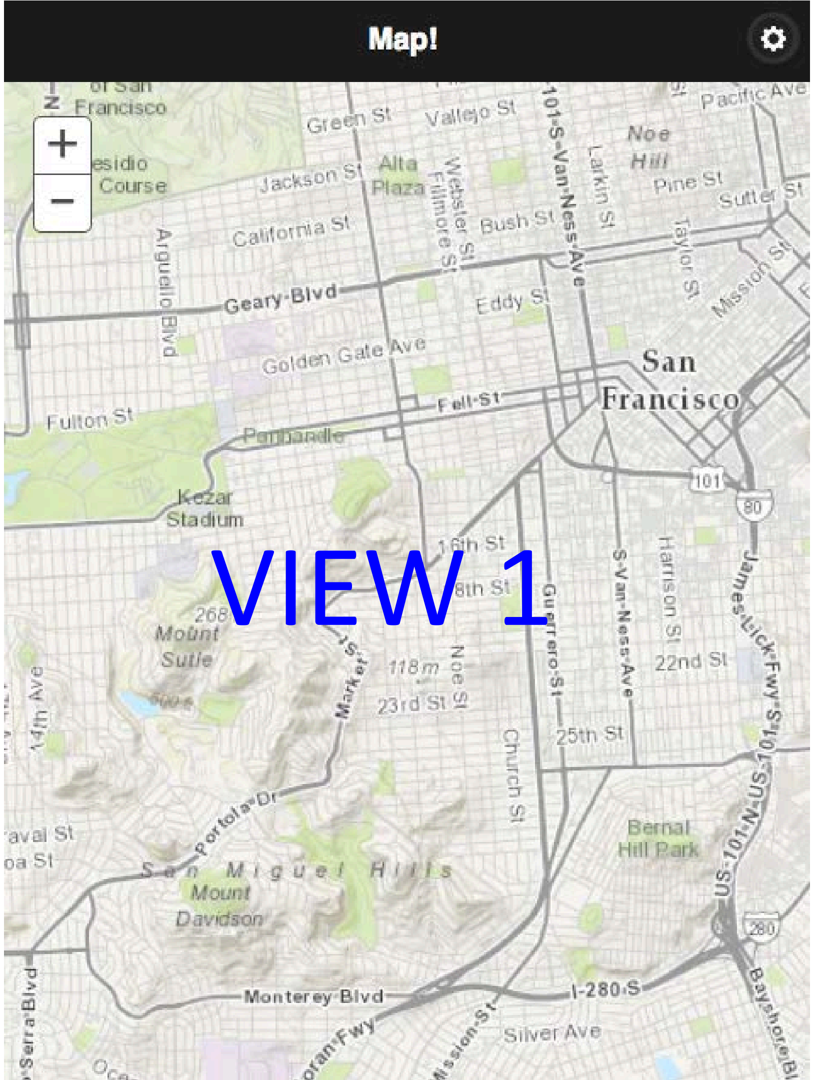
```
<body>

  <div class="container">
    <div id="mapDiv"></div>
  </div>

  <script src="http://code.jquery.com/jquery-1.11.1.min.js"></script>
  <script src="//maxcdn.bootstrapcdn.com/bootstrap/3.3.2/js/bootstrap.min.js"></script>

</body>
```

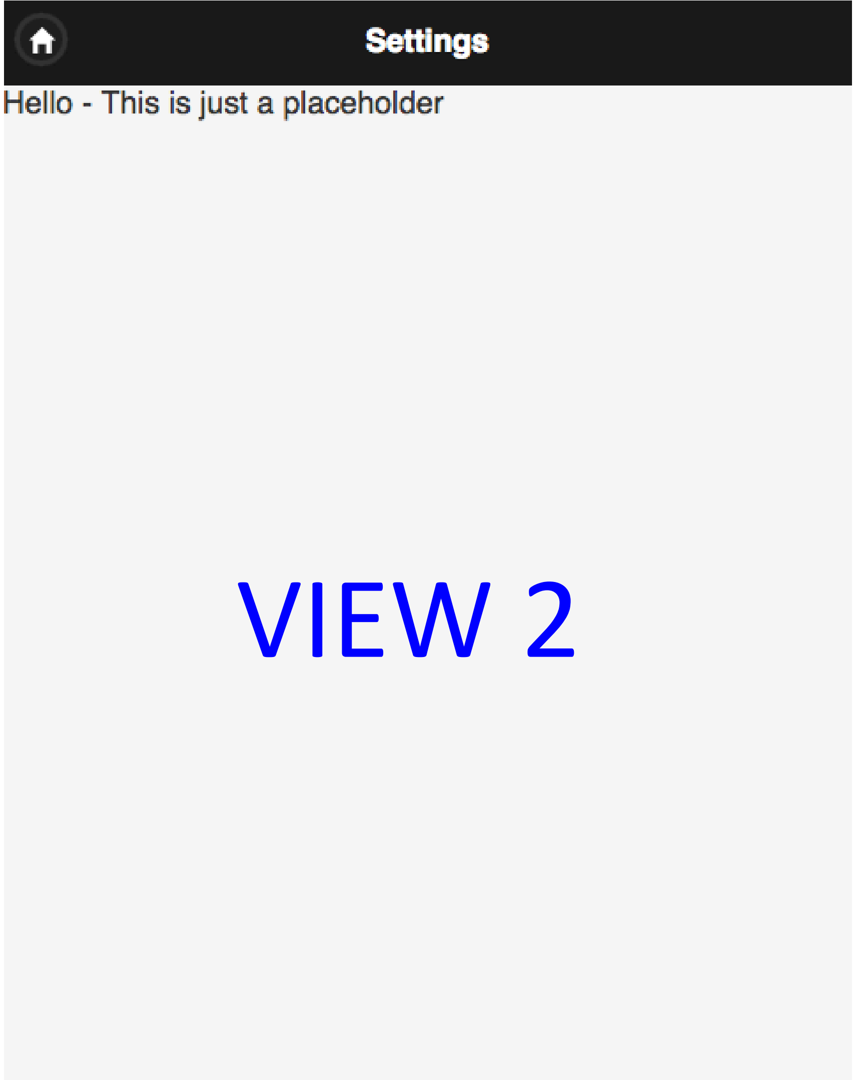
Add jQuery & ArcGIS JS API

```
<script type="text/javascript" src="//ajax.googleapis.com/ajax/libs/jquery/2.1.3/jquery.min.js">
</script>
<script type="text/javascript" src="//code.jquery.com/mobile/1.4.5/jquery.mobile-1.4.5.min.js">
</script>
<script src="//js.arcgis.com/3.13/"></script>
```

Add the map

```
var map;

$( '#home' ).on( 'pageinit',function(event){
    start();
});

function start() {
    require(["esri/map", "dojo/domReady!"], function(Map) {
        map = new Map("mapDiv", {
            basemap: "topo",
            center: [-122.45, 37.75], // longitude, latitude
            zoom: 13
        });
    });
}
```


Map!
VIEW 1
Green St
Vallejo St
Pacific Ave
Jackson St
Alta Plaza
Pine St
Sutter St
California St
Bush St
Geary Blvd
Eddy St
Golden Gate Ave
San Francisco
Fulton St
Fell St
Kezar Stadium
22nd St
25th St
23rd St
Church St
Bernal Hill Park
Mount Davidson
Monterey Blvd
Silver Ave


Settings
Hello - This is just a placeholder
VIEW 2

Step #5

Build > test > repeat

Build > test > repeat

Optimize CSS

Concatenate JS files

Use ArcGIS Web Optimizer

Minify & gzip

Geolocation

Geolocation

Works online and offline

Approximate location

Always requires user opt-in

Offline JS

Offline JS

Intermittent or no internet

Ability to reload or restart app offline

Lightweight cross-browser functionality

Github.com/esri/Offline-editor-js

Offline JS

Offline tiled maps for small areas

Offline editing and basic attachments

Offline TPKs (Tile Packages)

Github.com/esri/Offline-editor-js

Offline JS

Need a full features, robust offline solution?

- ArcGIS Runtime SDKs
- Integrated offline support for editing and sync
- Support for related tables, domains, subtypes and more.

Wrap-up

Mobile web has differences

5 Steps for building awesome mobile apps

Bootstrap

jQuery Mobile

Geolocation

Offline

Resources

github.com/lheberlie/mobile-webapps-js/blob/develop/Resources.md

github.com/lheberlie/phonegap-jquerym-js

Related Sessions

Optimizing your JavaScript App for Performance

Demo Theater 7

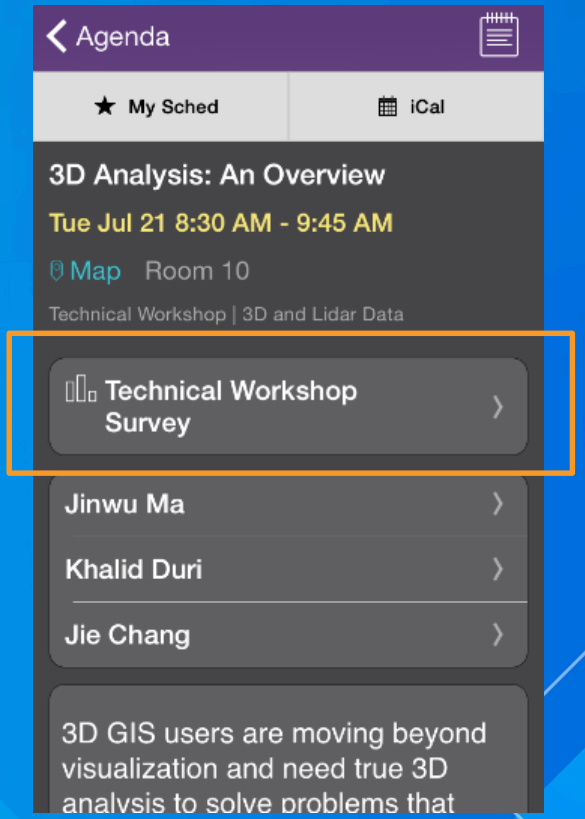
Wed. 4:30pm

Andy Gup
agup@esri.com
@agup

Lloyd Heberlie
lheberlie@esri.com
@lheberlie

Thank you…

- Please fill out the session survey in your mobile app
- Select Strategies for Building Mobile Apps Using ArcGIS API for JavaScript in the Mobile App
  - Use the Search Feature to quickly find this title
- Click “Technical Workshop Survey”
- Answer a few short questions and enter any comments



Understanding our world.